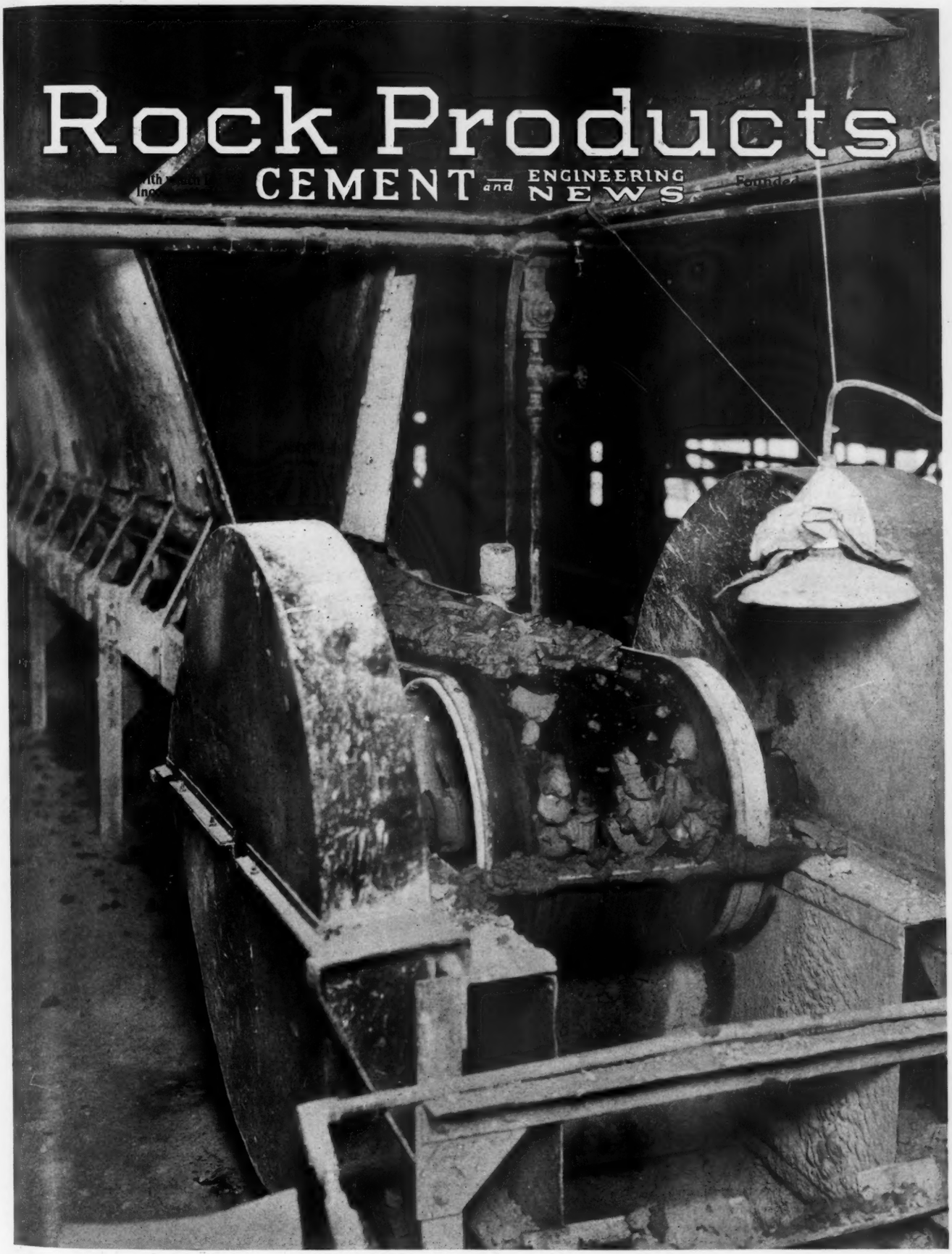
Volume XXXI Chicago, August 18, 1928 Number 17

Rock Products

CEMENT and ENGINEERING NEWS



Filter slurry cake as it is fed to the kilns at the plant of the Federal Portland Cement Co., Buffalo, N. Y.—the first cement mill in the world to include a filter installation in its original design

General view of the plant of the Federal Portland Cement Co., Buffalo, N. Y.

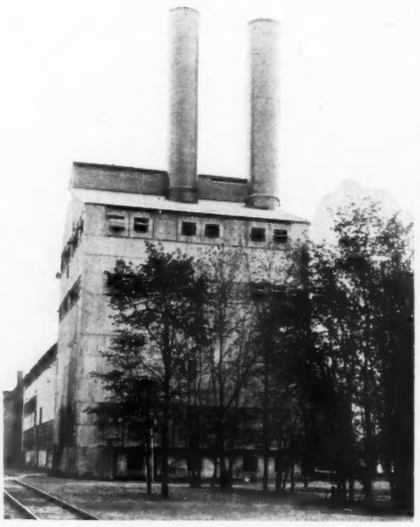
First Portland Cement Mill in the World Designed to Include Slurry Filters

Federal Portland Cement Company's Mill at Buffalo, N. Y., Also Is Only Plant Using Air-Cooled Slag and Limestone as Raw Materials in the Wet Process

THE Federal Portland Cement Co.'s plant at Bay View, just outside of the city of Buffalo, N. Y., is the only portland cement plant employing the wet process and using an air-cooled slag and limestone as raw material. It is one of the two existing plants that have been built with slurry filters as a part of the original design. There is a connection between these facts. In the opinion of those operating the plant it might be possible to run without filters, but it would not be so easy and it would be a great deal more expensive. The ability to keep the slurry at exactly the moisture content desired has been responsible for comparative freedom from mechanical difficulties. With slag the filters pay for themselves in other ways than reducing coal consumption although they are as successful in that as they are in plants using other materials.

The advantages of slag as a cement raw material have long been recognized. Every standard textbook on portland cement gives a tri-axial diagram showing the regions of blast-furnace slag and portland cement lying side by side proving that all that slag needs to put it in the cement field is a greater proportion of lime. This is easily given it by the addition of limestone. With the dry process slag presented no difficulty and many thousands of barrels of cement have been and are being made daily from slag and limestone by this method. But when it was attempted to use the wet process with slag and limestone operating difficulties arose. The slurry set in the storage tanks and choked the pipes through which it was pumped. The addition of sugar or dextrine to the slurry tended to prevent this, but there were reasons why this method was not entirely satisfactory.

At the Federal plant nothing is added to the slurry and the plant runs steadily and smoothly day after day. This was not always the case, and it took some experimenting to get it to run that way. At first fine metallic iron (which all iron slag contains) settled in the pipes and choked them until nothing could be pumped through them. A thicker slurry prevented the fine iron from settling out but it gave trouble by building up on the sides of the slurry tank. Finally, it was found that by carrying 39% to 40% of moisture in the slurry both these difficulties were obviated. A slurry of this consistency was found to be thick enough so that the fine iron would not settle out with the ordinary velocity of pumping through pipes, and it is sufficiently mobile so that it can be kept in thorough agitation in the slurry tanks which prevents "pasting up" or building up on the sides of the tanks. There is still some settlement, so that a slurry tank has to be cleaned out occasionally, but this does not happen often enough to interfere with regular production and it does not entail a loss that can be noticed.



The building that houses the slurry filters

It happens that the filters operate splendidly at 40% moisture. The output of filter cake is greater on slurry of 37% to 38% moisture and is reduced on 41% to 42% moisture slurry, but is ample to supply the kilns under all conditions. Hence, the 40% moisture is satisfactory for every part of the operation. The filter reduces the slurry noisture to something between 18% and 20% before the slurry goes to the kilns. The moisture in the filtered slurry varies with the difference in the raw material, slurry from cleaned stone giving the lowest moisture.

This method of operating with excess water, which is removed before burning the slurry, and also cooling the slurry to prevent premature settling, involves the use of a process patented by the Allis-Chalmers Manufacturing Co. (patents Nos. 1,184,856 and 1,589,712), under license to use which the Federal company operates.

Raw Materials

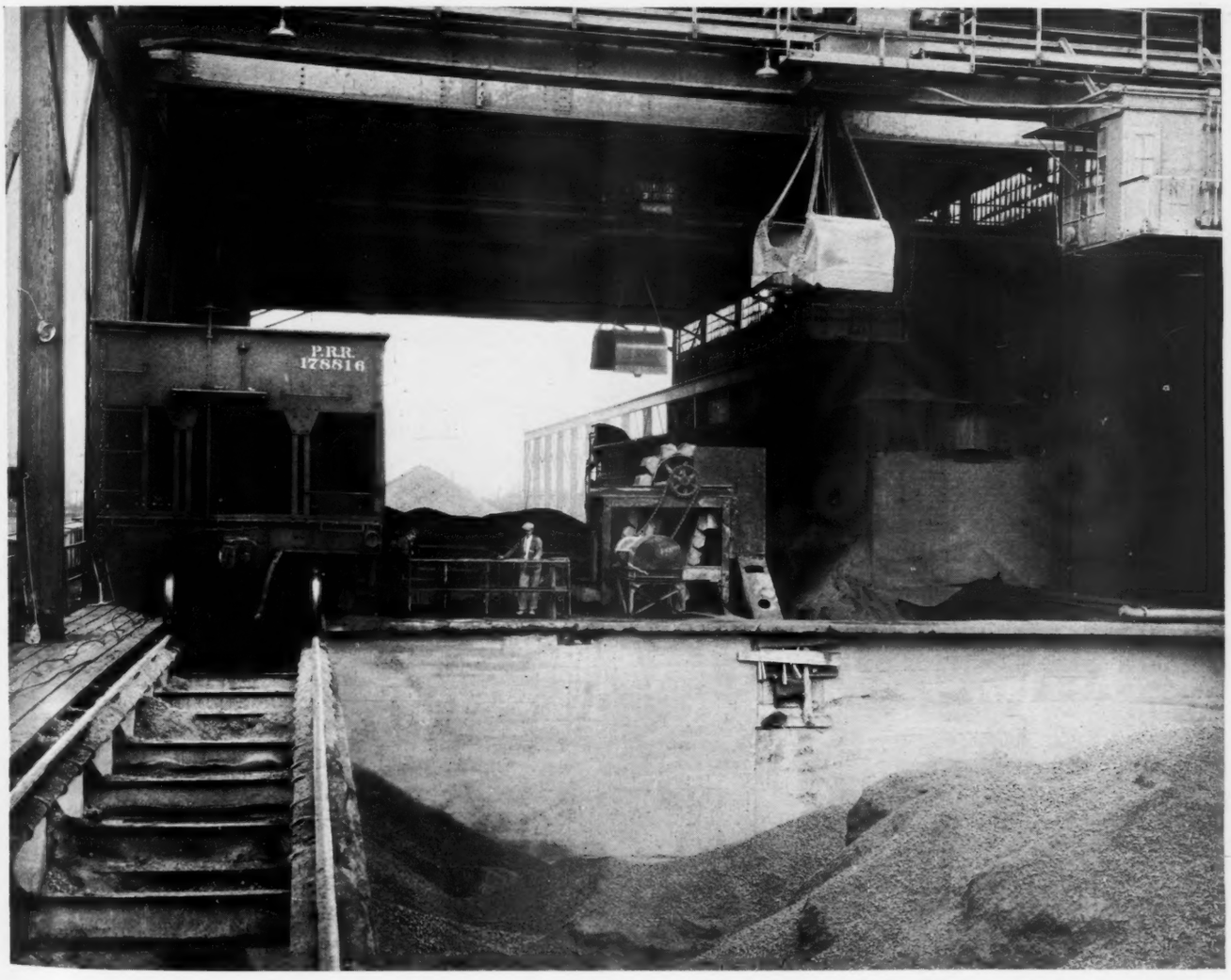
The proportions of the raw materials are 40% slag and 60% limestone. The slag is from a great pile that has accumulated from many years of running the Buffalo furnaces of the Bethlehem

Steel Co., which are not far from the cement plant. It is dug by steam shovels and loaded into 50-ton standard gage, hopper-bottom cars and brought in over a track that is about a mile in length. This runs over one side of the raw material storage, about 30 ft. from the ground, so that cars may be dumped to a small hopper over the primary crusher. The entire crushing plant is in an area 15 ft. by 30 ft. partitioned off by high walls inside the slag storage space.

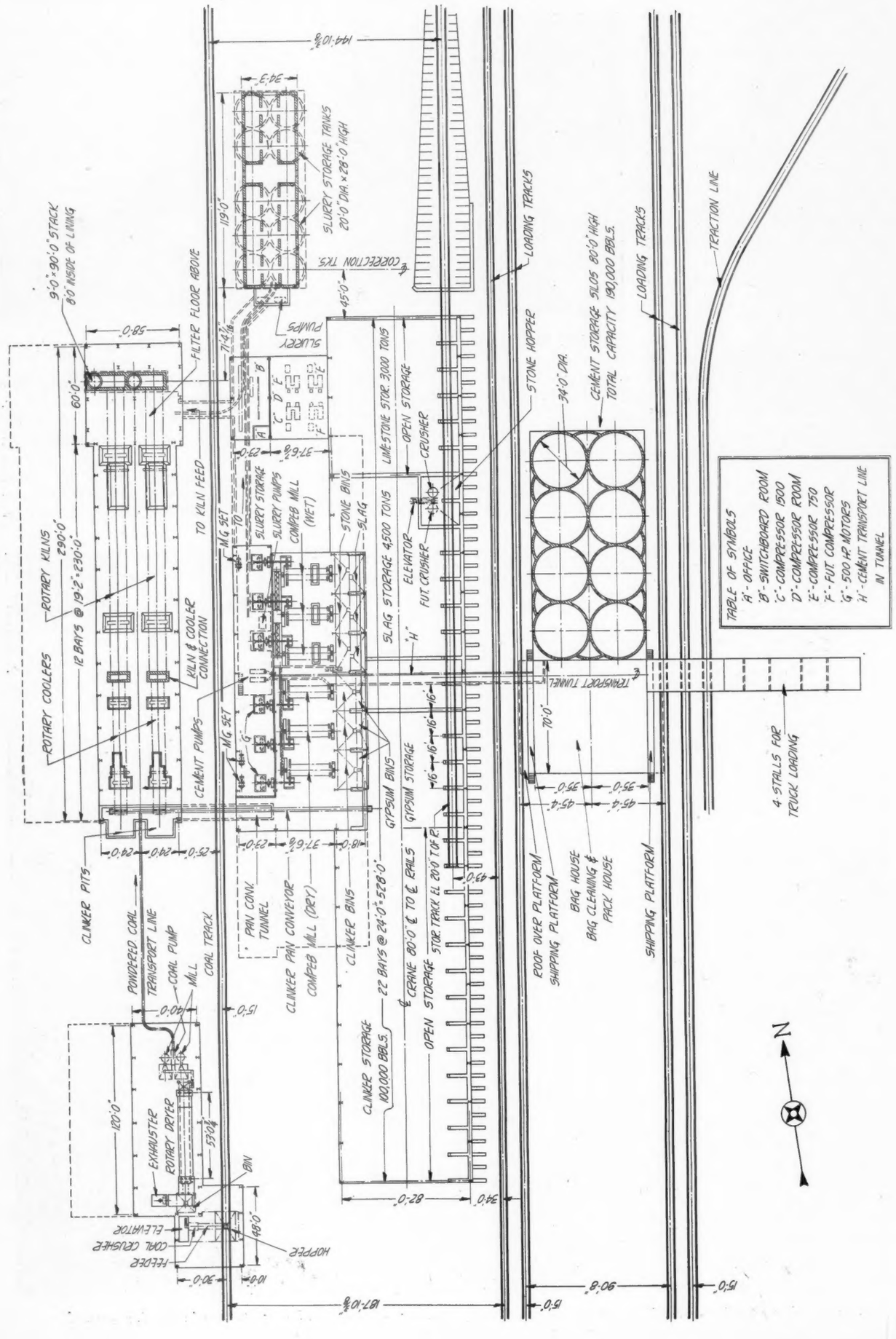
The slag drops from the hoppers of cars on to a narrow grizzly, with about 12-in. square openings, that serves to keep out the largest pieces and anything that will not go through is broken by bars or sledges.

Mill building at right, alongside the storage building showing at the left

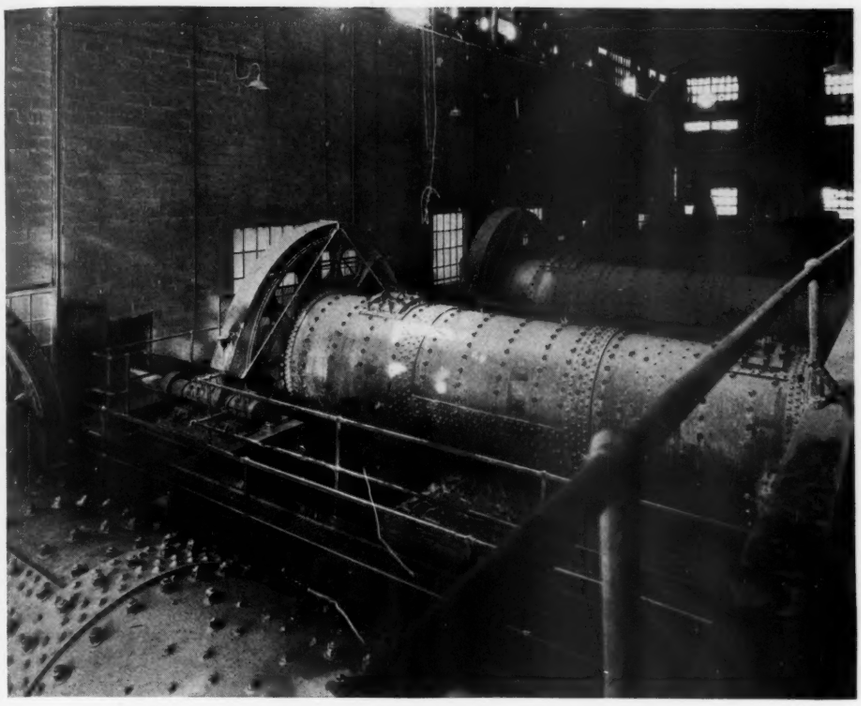
From the hopper the slag goes by gravity to a 10-in. Superior McCully fine-reduction gyratory crusher, driven by a 100-hp. motor which breaks it to 2-in. and smaller. This falls from the crusher into a 20-in. bucket and belt elevator, about 30 ft. high, of Allis-Chalmers make. The drive is a 5-hp. motor through a Palmer-Bee speed reducer. From this elevator the slag goes to a short 18-in. conveyor which has a Dings magnetic pulley for a head pulley to take out pieces of iron. These fall into a hopper and chute through which they flow into a small area partitioned off from the storage just outside the crusher room. The slag, freed from all the metallic iron that is not too much enclosed to feel the pull of the magnet, flows through another chute to a 4-ft. Symons cone crusher. This reduces it to ¾-in. and finer, the greater part being finer than ⅜-in. It flows from the crusher to the storage space, and it is picked up by the bucket of the traveling crane that serves the raw storage and distributed throughout the stor-



Storage buiding showing car of limestone on track, slag crusher, elevator and slag storage in the foreground



General plan of the Federal Portland Cement Co. plant at Buffalo, N. Y.



Mill room, clinker mills in foreground, raw mills in background

age space as it accumulates.

The raw material and clinker storage is 528 ft. long and 80 ft. wide between the crane tracks. The raw materials, the gypsum and part of the clinker, are under a roof and held in walls 20 ft. high. The remainder of the clinker is stored in the open, the crane track being carried on steel bents which rest on the ground. Beginning at the north, the raw material end, there is a space holding 3,000 tons for limestone, one holding 4,500 tons for slag, the gypsum storage, 24 ft. by 80 ft., and finally the clinker storage holding about 100,000 bbl. There are two 15-ton cranes, both of Whiting make, above the storage and each has a 3-yd. bucket made by the G. H. Williams Co., of Erie, Penn.

One side of the mill house adjoins the storage. It contains six Allis-Chalmers "compeb" mills, 7x26 ft., three for raw grinding and three for finish grinding. The feed ends of these mills are next to the storage and the feed comes from bins in the storage house which are filled by the cranes.

There are two bins behind each raw mill, one for limestone and one for slag, and the proportioning is done by Schaffer poidometers, one for each, that serve as feeders for the mills. On the discharge end of the belt under the slag poidometer is a Dings magnetic pulley to remove the iron freed by crushing in the Symons cone crusher. This magnetic pulley was not included in the original design. Since it was put in there has been less trouble with metallic iron settling out in the tanks and pipes, although the amount of iron actually taken out by the pulley is relatively small but important to satisfactory operation.

The slag as dug is fairly uniform in composition, but to insure as even a mix as possible the crane man goes around the slag storage in filling the mill bins so that each round is fairly representative of the whole.

Limestone

The limestone, the other component of the slurry, which joins the slag at the feed end of the mill, is not produced by the company. Most of it is bought from the Michigan Limestone and Chemical Co. and comes from the big quarries of this concern at Calcite, Mich. It is delivered by boats at the Bethlehem Steel Co.'s docks, loaded on railroad cars and brought into the plant over the same line as that used for the slag cars. It requires no crushing as it is screenings about $\frac{1}{8}$ in. and less in size. The cars dump it directly into the limestone storage and the crane loads it into the mill bins as it does the slag.

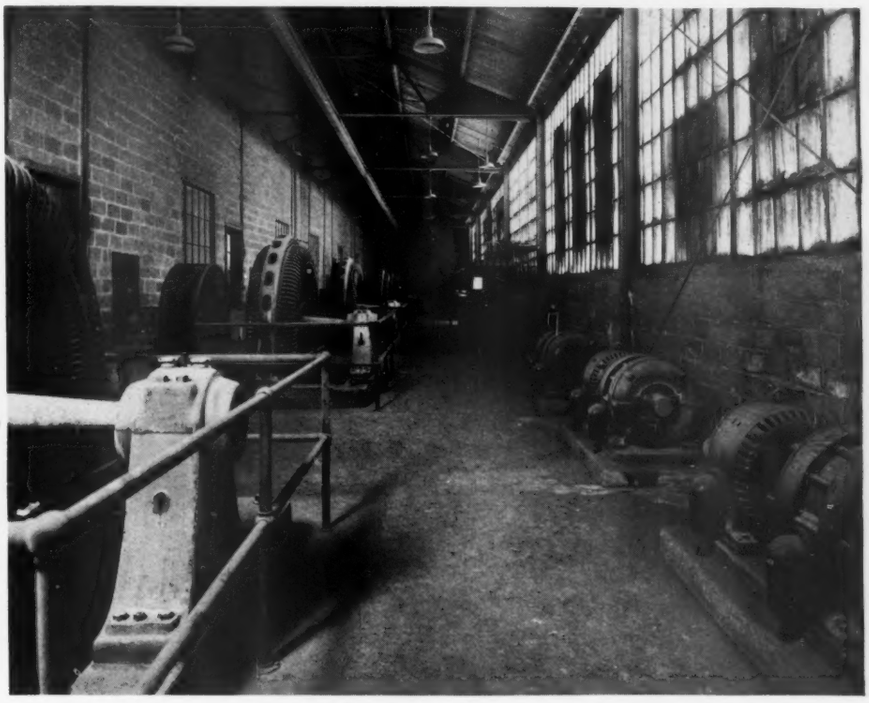
Recently, some limestone from the worked out Pekin quarries near Buffalo has been used, the company having acquired a large pile of screenings left from the former operation of the plant. This can be used satisfactorily so far as the lime content is concerned but it does not make so good a cake on the filter.

The limestone from the Calcite quarries contains about 98% $CaCO_3$ and is exceptionally free from dirt and impurities.

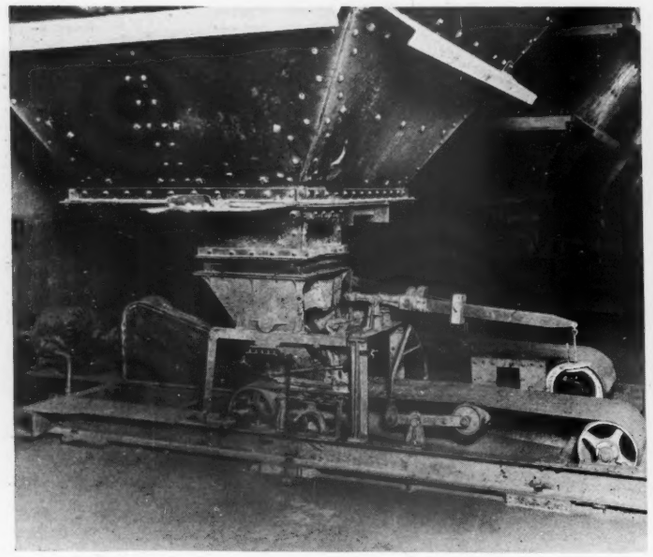
Raw Grinding and Slurry Agitation

Raw grinding of the slag-limestone mixture is carried to something better than 90% through 200-mesh in the "compebs," chrome steel balls and 1¼-in. concavex being used as the grinding media. Water is added at the mills and the water fed is carefully regulated by the mill man who gets an hourly report on the moisture content of the slurry. Unusual care is taken to keep the moisture content constant at this point, for, as has been explained, this is one of the important features of the process.

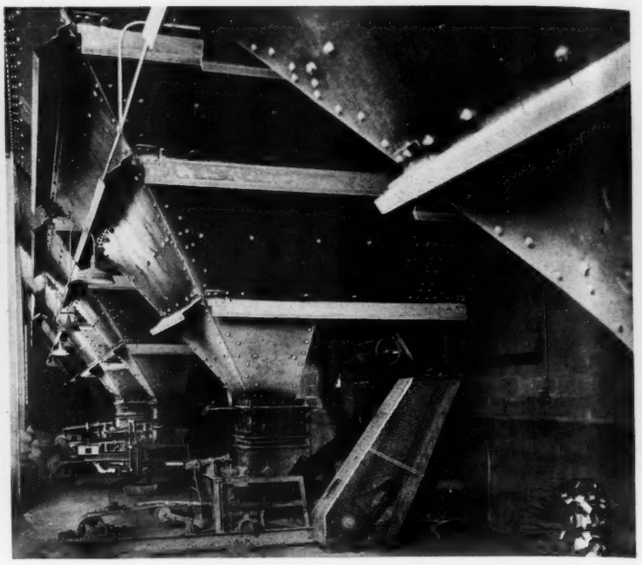
The slurry flows by gravity to two



Synchronous motors driving the raw and finish mills



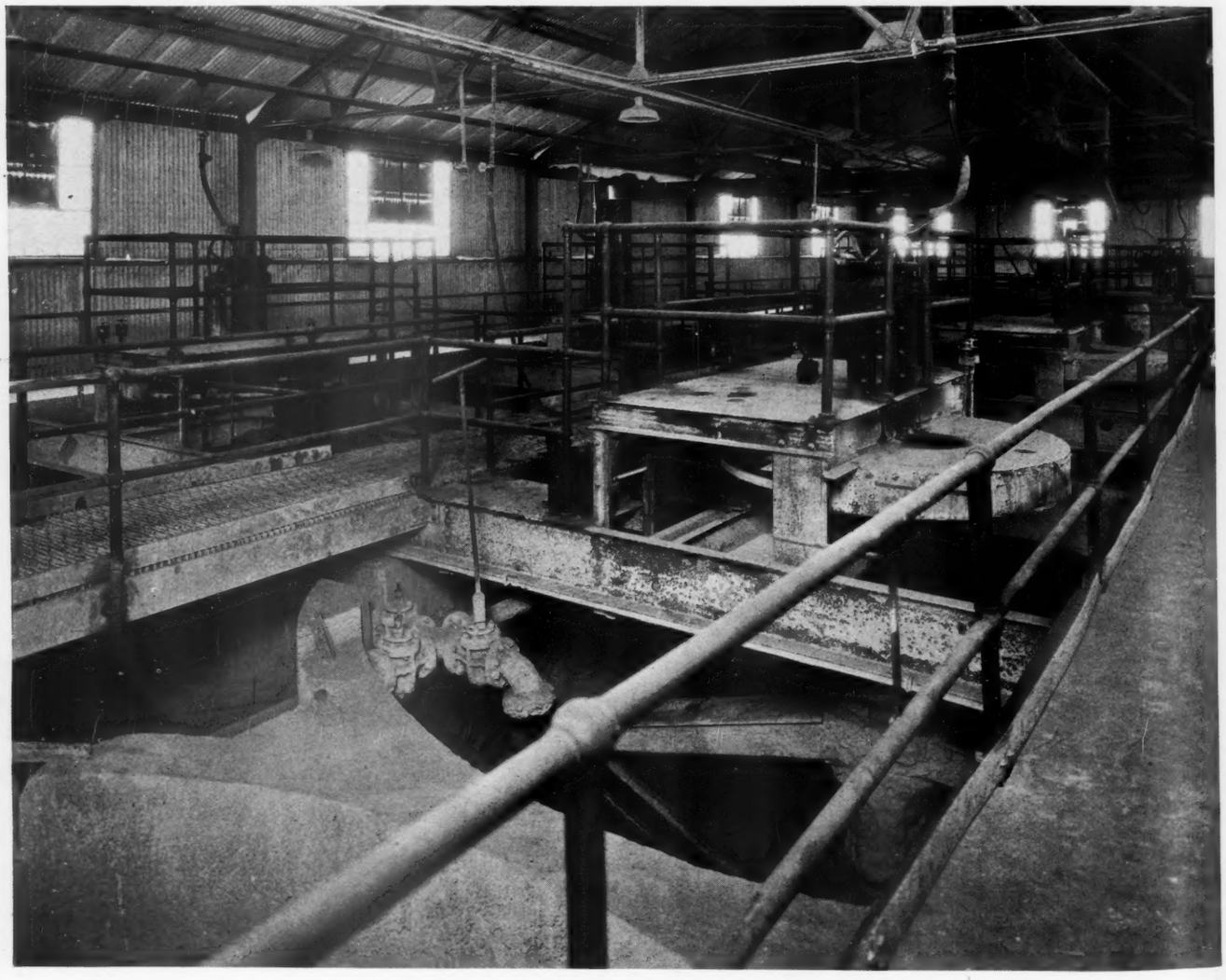
Proportioning devices for slag and limestone



Battery of proportioning devices in gallery of mill room

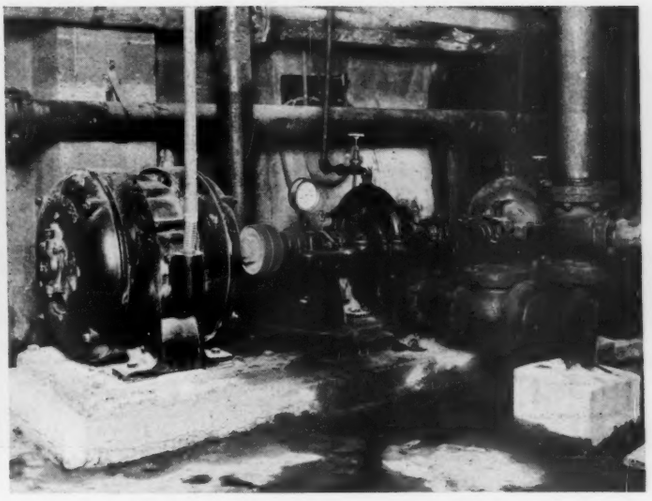
sumps in the basement of the mill house from which it is sent to the slurry tanks by two Wilfley No. 4 pumps each driven by a 40-hp. motor direct-connected.

The drives of all the compeb mills on both the raw and finish grind sides are 500-hp., synchronous motors connected through Cutler-Hammer magnetic clutches, which are 60-in. in diameter, somewhat larger



Slurry tanks and agitators are completely housed

Slurry pumps and controls



Water pumps for Lake Erie intake

than are generally used with motors of this size. The motors and their exciters are placed in a motor house running the full length of the mill house, the shafts of the motors passing through the walls to the mills. Each motor has its own panel for starting and stopping. In the

Barometric sump under filters

case of short shut-downs the clutch is thrown out and the motor left running. This is good practice as the motor acts as a stabilizer and decreases the load factor, and the start is more easily made.

The pipes for the slurry are in a tunnel connecting the mill basement and the basement under the slurry tanks. There are two tunnels from the mill basement the other going to the packhouse. A short branch from the tunnel to the slurry department goes to the kiln house, and in severe weather these tunnels are used as walkways, being made amply large for the purpose. Besides the pump lines the tunnels carry the electrical cables for the different departments, the water lines and the lines from the Fuller-Kinyon pumps. The water pumps placed in the tunnel to the slurry house are two 6-in. Allis-Chalmers centrifugals of the high-efficiency type, each driven by a 40-hp. motor, direct connected. The water comes from Lake Erie through an intake 1800 ft. from the shore.

There are 10 slurry tanks, each 20 ft. in diameter and 28 ft. high over all. Each tank will hold enough for 6 hours' operation of the kilns, and it is the custom to run on stored slurry over Sunday, the mills having sufficient capacity to accumulate enough slurry for seven days running in six days.

All slurry tanks are provided with Dorr agitators, a combination of sweeping arms at the bottom, which draw the slurry to the center, and a central air lift. The sweeping arms are provided with air jets that help to keep the slurry near the tank wall well stirred. The drive of this agitator is a Westinghouse or Allis-Chalmers 7½-hp. motor through a Philadelphia Gear Works speed reducer.

The air for agitating comes from a low pressure 23x12-in. Ingersoll-Rand compressor in the power house, driven by a 150-hp. squirrel cage motor. There are three compressors of the same size, all driven by the same size and type of motor, but the others are high pressure machines. One is to furnish air for tools, blowing motors and other uses about the plant and the other is held as a reserve. It is fitted with a reducing valve so that it can take the place of either the high-pressure or low-pressure machine when one or the other is shut down. The ordinary pressure used in agitating is 25 lb. per square inch.

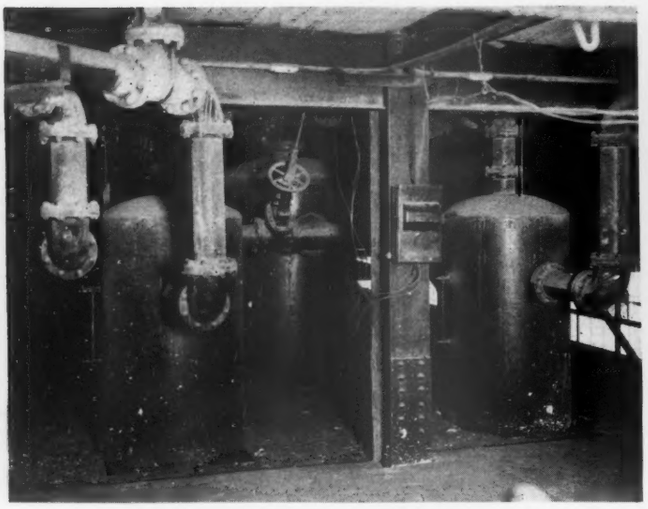
Two Wilfley No. 4 pumps driven by 40-hp. motors in the basement of the slurry house transfer the slurry as needed to make corrections or pass it from one tank to another. The piping system permits transfers from any tank to any tank. All pipe lines are fitted with Nordstrom valves.

The slurry tanks are connected to form a solid wall and they support a roofed-over structure which covers the agitators. The basement is made wider than the tanks and covered over with a concrete roof resting on walls about 4 ft. above the ground. This gives ample space for working around the tanks where the valves are placed.

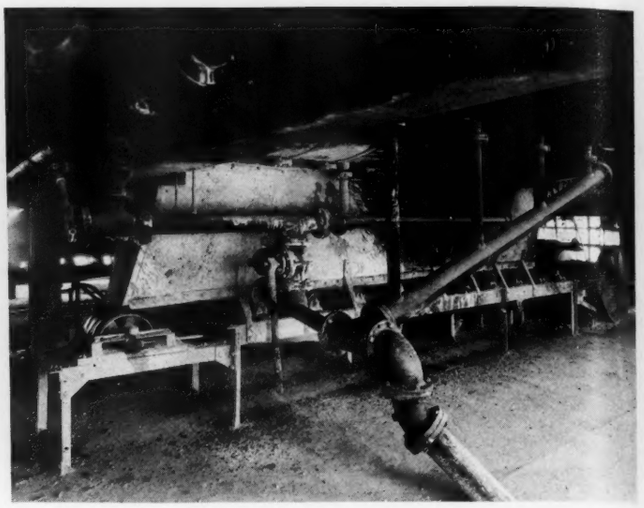
Filtering the Slurry

Either of the two Wilfley pumps just mentioned may be used for feeding the filters while the other is transferring slurry

Close-up of slurry agitator



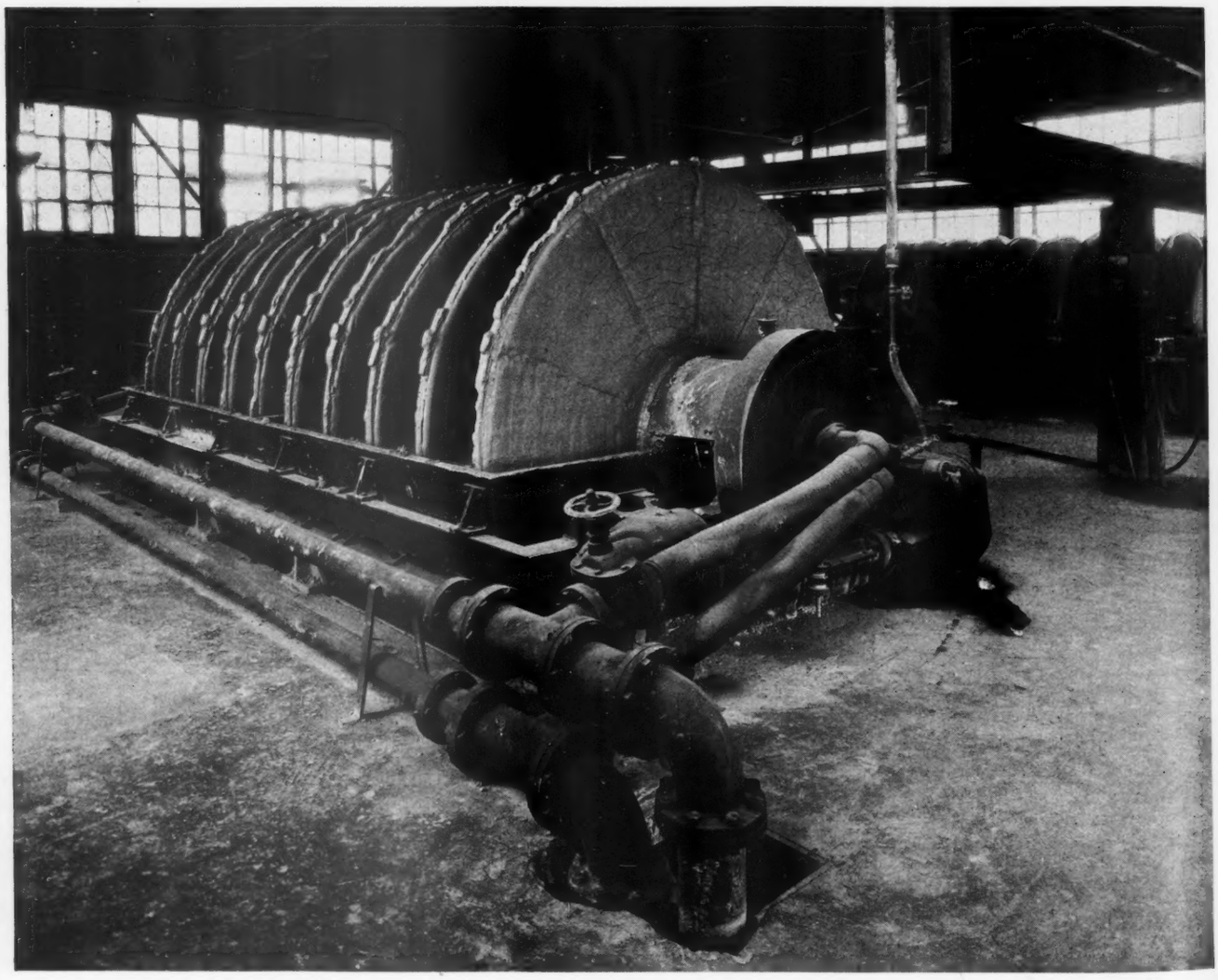
Vacuum receivers on slurry filters



Floor below filters, showing conveyor for filter cake

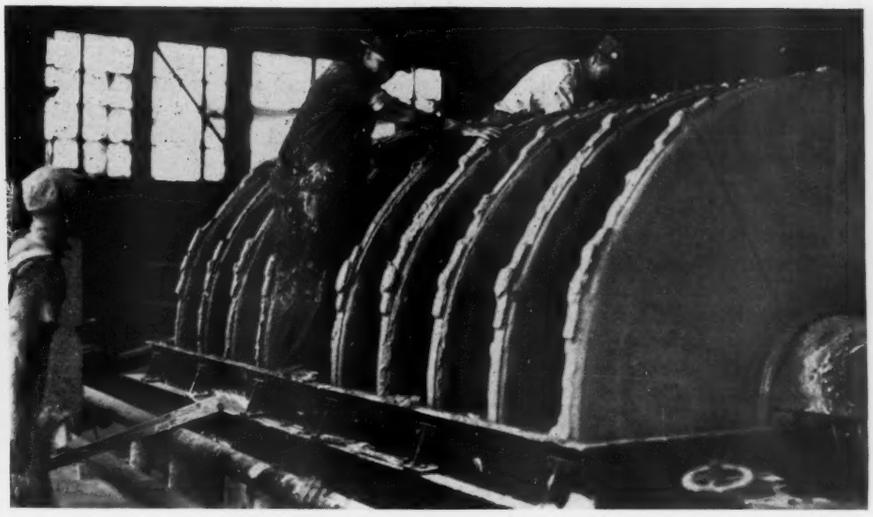
or held as a reserve. The tanks of the filters serve as kiln feed tanks and are provided with several overflows, one between each pair of disks, to keep the height of the slurry constant.

The two filters are the "American" type made by the Oliver United Filters Corp., successors to the United Filters Corp. and the Oliver Filter Co. Each has ten disks of 100 sq. ft., so that there is 2000 sq. ft. of surface altogether. The drive of each is a 5-hp. direct-current motor through a James speed reducer and a worm gear. As the filter serves as a kiln feeder a wide range of speeds has to be provided and the



Slurry filters in operation at plant of Federal Portland Cement Co.—air pipes shown in foreground

Showing how filter cake is removed



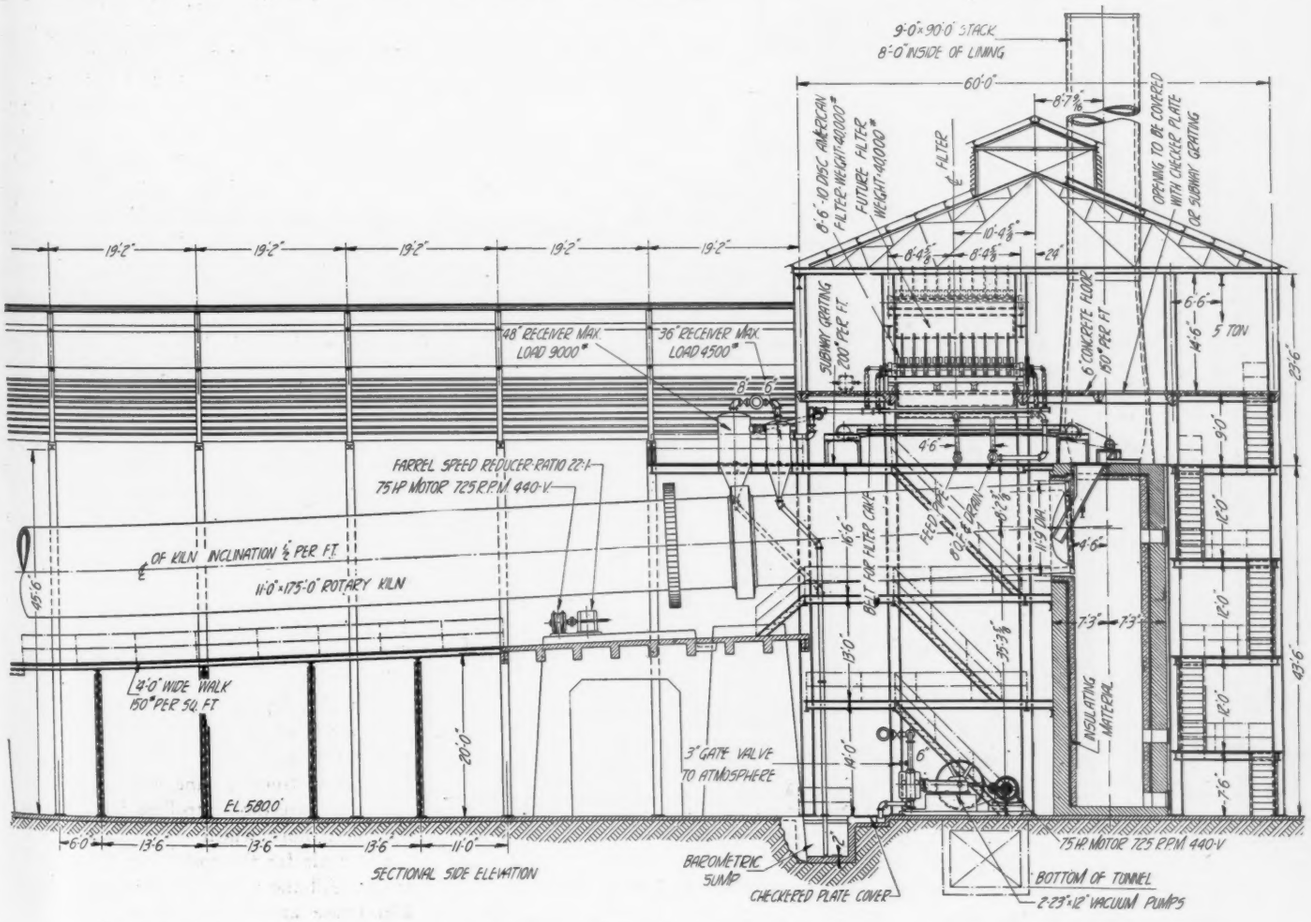
Replacing a sector of one of the filter disks while the filter continues in operation

direct-current motor gives this in a simple way. The speed may be varied to anything desired between one revolution in 4½ min. to one revolution in 9 min.

Each filter disk is made up of ten sectors and these sectors are readily removable. Whenever a leak occurs the sector containing it is located and withdrawn and another sector put in its place. As the filter moves slowly the change can usually be made without shutting down.

The cake built up on the filter disk varies according to the material treated, but with clean limestone and slag it is from ¾-in. to 1-in. in thickness. With materials more generally used, such as limestone and shale or clay, containing some colloidal matter, the thickness of the cake is less, ⅜-in. perhaps, being an average figure.

The vacuum by which the filter cake is built up while the disk is in the tank and afterwards held for the drying out process is furnished by two Ingersoll-Rand vacuum pumps, Type XB-1, 23 in. x 12 in. Each is driven by a 75-hp. motor. One pump is found ample to serve both filters so the other is held as a reserve. Between the filters and the vacuum pumps are three vacuum receivers, one of which corresponds to the receivers



Longitudinal cross-section through kiln building showing how slurry filters were fitted into the original design

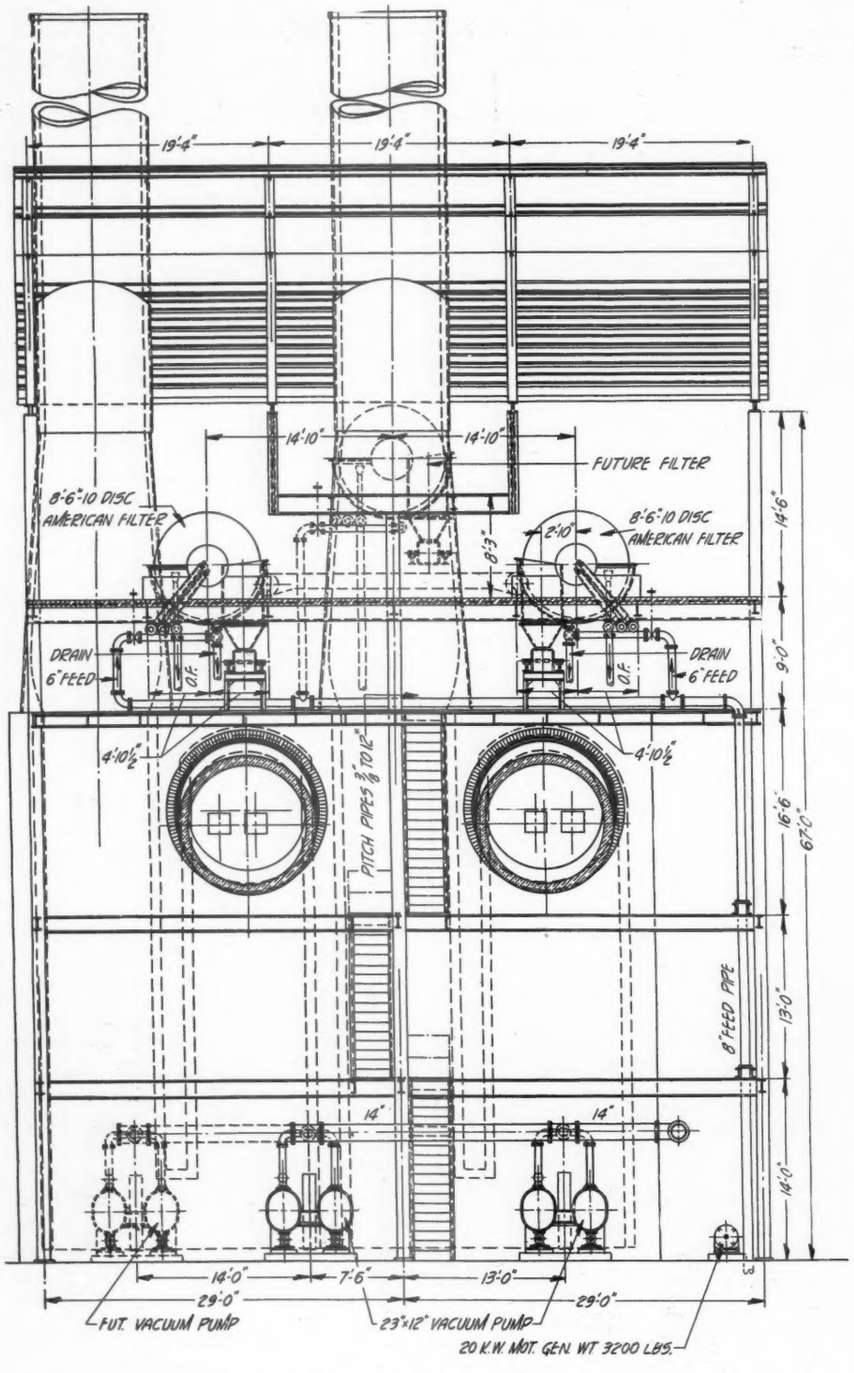
used with an air compressor except that the air within is under a partial vacuum instead of under pressure. The two small receivers take the water from the filters and discharge it through a pipe into the "barometric sump" below. The large receiver acts during the latter part of the cycle—during drying—also discharging to the barometric sump. They are set high enough (above 32 ft.) so that the vacuum cannot raise the water, and this maintains a vacuum on the discharge of the filter. The vacuum carried is from 23 to 27 in. of mercury, varying with the barometer and the condition of the slurry. It may be noted that the elevation of the plant is 580 ft. above sea level, which slightly modifies the efficiency of the vacuum pumps.

Two vacuum pipes are provided for each filter so that different degrees of vacuum may be carried for building the cake and drying out.

For removing the filter cake at the end of the cycle, a little low pressure air is used, just enough to distend the canvas slightly and so free the cake. This is furnished by an ingenious device, an application of the injector principle. A small jet of compressed air blows into the open end of a 1-in. pipe and carries enough air with it to give a sufficient volume of low pressure air to do the work. The pressure produced in this way is not enough to offer any damage to the canvas.

The clear water drawn from the slurry goes to the barometric sump mentioned and a weir that keeps it full on the lower floor of the kiln house and flows from that to the lake. It does not show more than a slight cloudiness (due to colloidal material) unless there is a break in the canvas.

The pieces of filter cake, containing 18% to 20% of moisture fall through openings between the disks into an open hopper above a 20-in. conveyor belt 20 ft. long which is driven by a small motor and a Palmer-Bee speed reducer. From these belts the filter cakes go directly into the kilns through a chute inclined about 45 deg.



Cross-section through kilns showing elative positions of filters and provision for a third filter

Kilns and Coolers

There is not much difference in the kiln practice of burning filter cakes in place of liquid slurry, although a greater output can be secured, as there is less moisture to evaporate. In order to handle the greater amount of material for this increased output, a spiral of "super-ascoloy steel," a metal designed to withstand high temperatures, was installed in about 15 ft. of the unlined part of the kiln The cake, after passing this spiral, travels similarly to the dry material in any kiln.

Each kiln is connected to a "Topalog" recording pyrometer, made by the Wilson-Maeulen Co., and its record of stack gas temperatures is the principal guide for the burner. The stack gases (taken at the kiln center just where the kiln enters the dust chamber) run around 1300 deg. F., and the line on the record shows that there is very little variation from this temperature. Changes do not show so quickly with filtered slurry as with wet slurry. An increase in the feed does not carry so much water as the same increase in wet slurry would carry and hence it does not have the same effect on the flame.

A somewhat higher kiln speed and a somewhat heavier bed of material are carried when burning filtered slurry as compared with the usual practice and an unfiltered slurry.

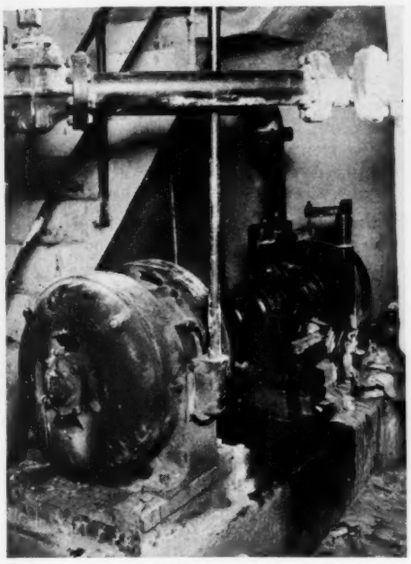
The kilns are of Allis-Chalmers make, 175 ft. long and 11 ft. in diameter throughout. Each is on four-roller supports and the drive is a 75-hp. motor through a Farrel-Birmingham reducer and three sets of gears. They are lined with General Refractories HR special bricks furnished by the Stroh-Butler Co., Youngstown, Ohio. The drive motors are of the slip ring type, the resistances and controllers being placed on the burner's platform at the ends of the kilns. Here, too, are the controllers for the direct-current motors which drive the filters and the controls for the coal fan and coal feeder screw. All the wires for the motors in the kiln house are brought through this point and fused, all the fuses being in a closed

steel cabinet on the burner's platform.

Each kiln has a steel stack 90 ft. high placed above the dust chambers, which are 40 ft. high. Regulation of the draft is mainly by opening and closing doors at the base of the stack.

Powdered coal is used as fuel and it is blown into the kilns by a "Sirroco" (American Blower Co.) fan, direct-connected to a 40-hp. motor. The coal feeder is of the double screw type made by Allis-Chalmers and is driven by a small motor.

The clinker falls from the kilns into two



Slurry pump

8 ft. by 80 ft. cylindrical coolers, made by Allis-Chalmers, which are driven by 30-hp. motors through Farrel-Birmingham reducers and cut gears. The coolers are lined for half their length with fire brick and do not contain lifters or blades to force the clinker forward, the inclination and speed being enough to make it travel well. From the coolers the clinker falls on a Webster pan conveyor of about 200 ft. centers, which passes out of the kiln building through a tunnel and then rises on about a 40-deg. incline

Slurry tanks showing method of housing agitators

on a belt conveyor to a point above the storage wall where it falls by gravity to the clinker storage. From this point it is distributed in the storage by the crane and afterward recovered by the crane and placed in the hoppers of the raw mill.

Coal Mill

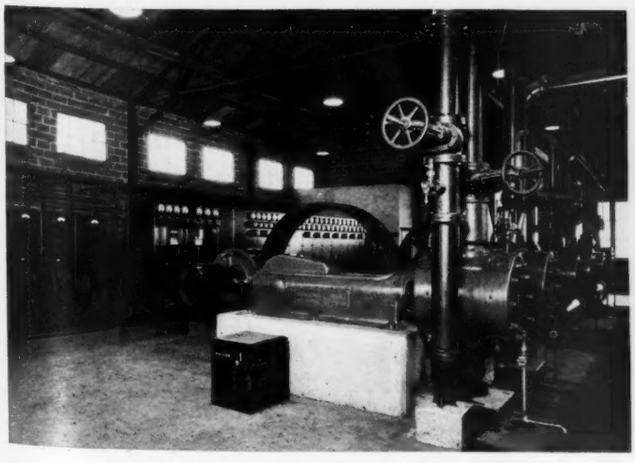
Pennsylvania soft coal is used for fuel and on account of the low moisture content of the filtered slurry the coal consumption is low. It usually runs from 96 lb. to 97 lb. per barrel and never exceeds 100 lb. Coal is received in hopper cars of the drop bottom type which are unloaded with a 16x24 ft. track hopper in front of the coal mill. From this it is fed to a Jeffrey roll crusher driven by a 20-hp. motor, which discharges to an enclosed elevator 40 ft. high. This lifts it to the hopper of the coal dryer. The dryer is 60 ft. long and 6 ft. in diameter, made by Allis-Chalmers and driven by a 15-hp. motor through gearing. It is provided with a dust collector, a small fan of the exhauster type driven by a 10-hp. motor and connected to an 8-ft. cyclone.

The dried coal is elevated by a short elevator to a Schaffer poidometer and passes from that to a screw conveyor that distributes it to the hoppers of two coal pulverizers. These are Fuller-Lehigh mills of the usual type, each driven by a 125-hp. motor, and they are placed on either side of a Fuller-Kinyon pump, driven by a 25-hp. motor. This pumps the powdered coal through a line about 150 ft. long to the powdered coal hoppers above the kilns.

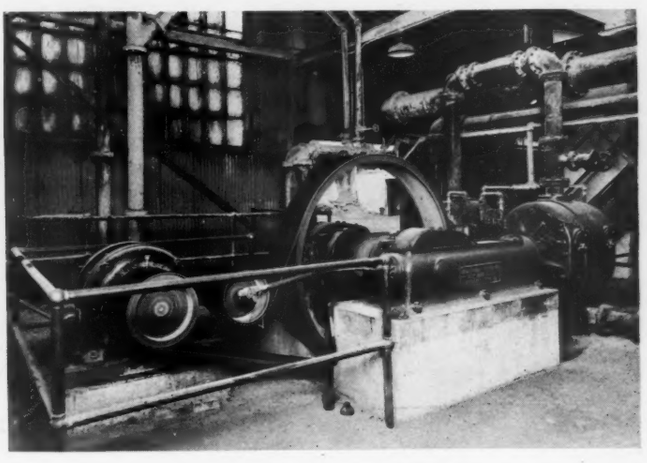
Finish Grinding and Packing

The three finish-grind mills are Allis-Chalmers two-compartment 7x26 ft. "compeb" mills exactly like those on the raw grind side of the mill house except that the raw mills are equipped with combination division heads, and the clinker mills with grid type division heads. Each is driven by a 500-hp. Allis-Chalmers synchronous motor through a Cutler-Hammer magnetic clutch.

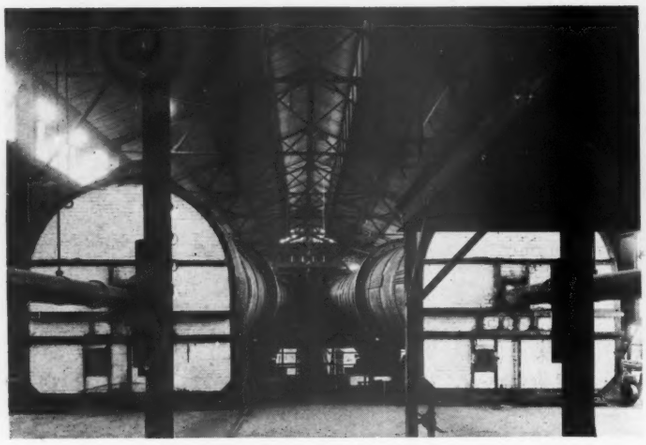
A feature of the clinker grinding in this plant is the use of the Sly dust collecting and cement cooling system which has been recently installed. The cement from the



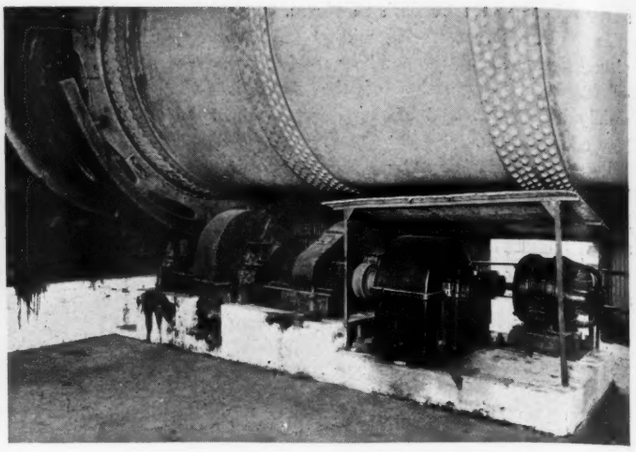
Air compressors for agitating slurry, etc.



The vacuum pump on the filters

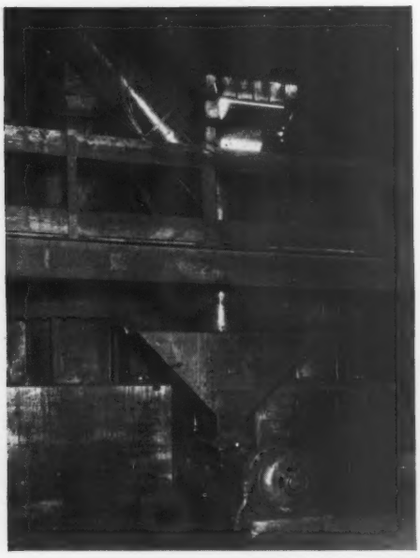


Kiln room from firing floor



Kiln motor drive and gears

mills falls down a square vertical chute on the sides of which are louvres for the admission of air. This is connected to an exhaust system, suction coming from a fan driven by a 15-hp. motor. The air entering through the louvres picks up a part of the cement and draws air through all of it, thus cooling it. The other part of the cement



Coal mills and pump

falls through and enters a long covered screw conveyor, made by the Webster Manufacturing Co., and driven by a 15-hp. motor. The cement lifted by the air current is caught in the Sly dust collector above the mills and rapped off so that it falls into screw conveyors, which take it to a pipe through which it falls into the screw conveyor below the mills. It is thoroughly mixed with the part that has not gone through the dust collectors by the action of the conveyor, so that it is a uniform product when it falls from the conveyor to the hopper of the Fuller-Kinyon pumps.

The efficiency of this dust-collecting system is such that the air in the mill house is entirely free from dust at all times. The cooling effects a drop in temperature of 100 deg. F. Under normal conditions the cement leaving the mills will have a temperature around 300 deg. F. and be discharged to the Fuller-Kinyon pumps at 200 deg. F. The same system is used in the Bessemer Limestone and Cement Co. plant near Youngstown, Ohio, which belongs to the same organization.

Gypsum is added at the finish grind mill by an adjustable feeder which was designed by S. L. Duvall, the plant superintendent.

Grinding the clinker is carried to 88% through 200-mesh for the finished cement.

From the screw conveyor mentioned above the cement falls into a sheet iron hopper to two 6-in. Fuller-Kinyon pumps with 125-hp. motors. One of these is easily able to do the work, the other being held as a spare. A 4-in. pipe plug in the side of the hopper above the pumps provides a good place to take the samples for control work. The pump line is about 200 ft. to the center of the silos and there is a rise of 100 ft.

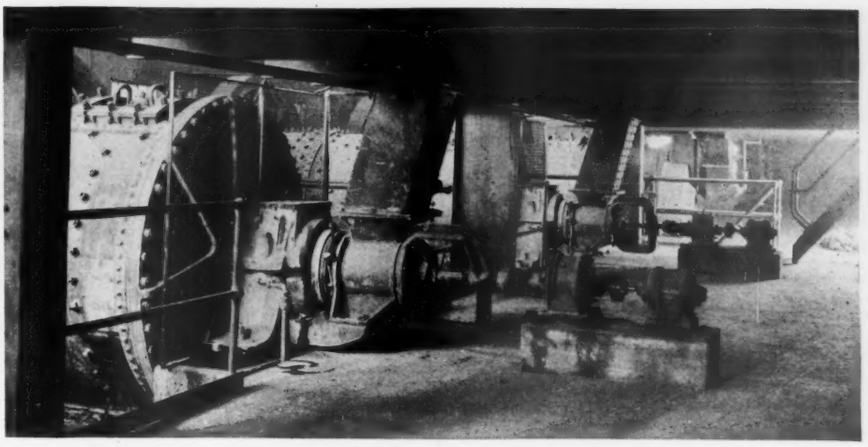
There are two rows of four silos set closely together for the cement storage, and the space between them is used for bins in the usual way. But the exterior spaces between silos are also made into bins at this plant by putting a short curved wall on the outside of this space. In all there are 19 bins and silos in which to store cement and the combined capacity is 190,000 bbl. The silos are 80 ft. high and 34 ft. inside diameter.

Recovery of cement from silos is by four lines of 16-in. screw conveyors about 140 ft. long. Each is driven by a 30-hp. motor and a Palmer-Bee speed reducer. These feed to a shorter cross conveyor driven by a 15-hp.

Coal dryer in coal mill building

motor and Palmer-Bee reducer. From this the cement goes to an elevator which lifts it to a screen on an upper floor. The cement falls to a screen from which it is distributed to the bins above Bates valve bag packers. There are four packers, all of the three-valve type, which seems to be the preferred type in the newer cement plants. From the packers the bags go to cars by conveyor belts of the usual design.

These are in the main packhouse, a building 70 ft. square with four floors set close to the silos. It is used for loading railway car shipments. But there is a second packhouse in a smaller building across the tracks designed for loading truck shipments in which there are four other packers. These feed to moveable conveyors that can be raised and lowered to accommodate themselves to the trucks that are being loaded. This packhouse gets its feed from the silos through a long 16-in. screw conveyor which feeds into an elevator that lifts it to the packing bins. It is complete in every way so that a very large part of the output could be shipped by truck if it were desirable to do so.

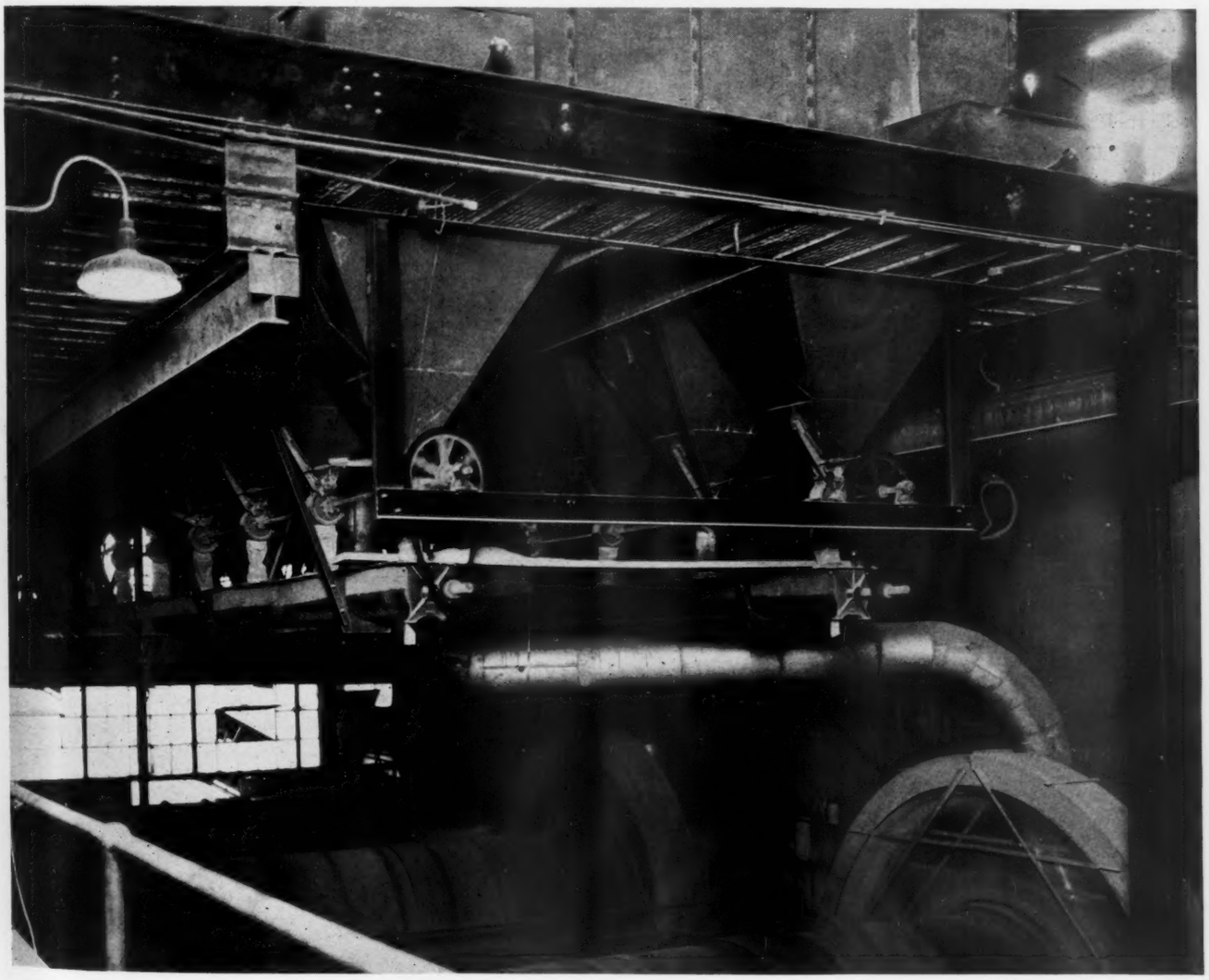


Feed ends of finish grinding mills

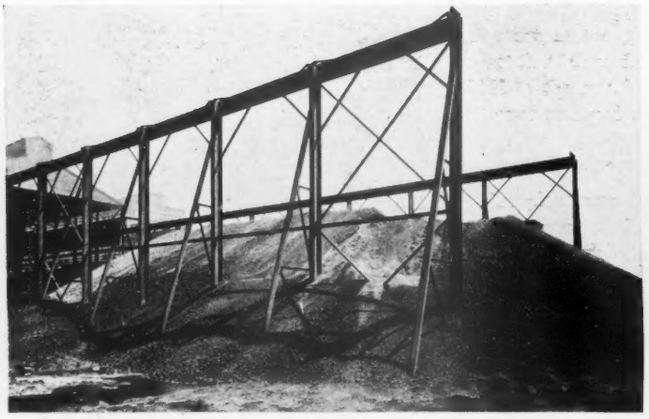
All the screw conveyors in both packhouses were made by the Webster Manufacturing Co.

In the main packhouse (the other is called the "Island" packhouse to distinguish it) bags are taken to the second floor and put through a "Nazco" bag cleaner with automatic discharge. They are then elevated to the floor above for sorting and repairing.

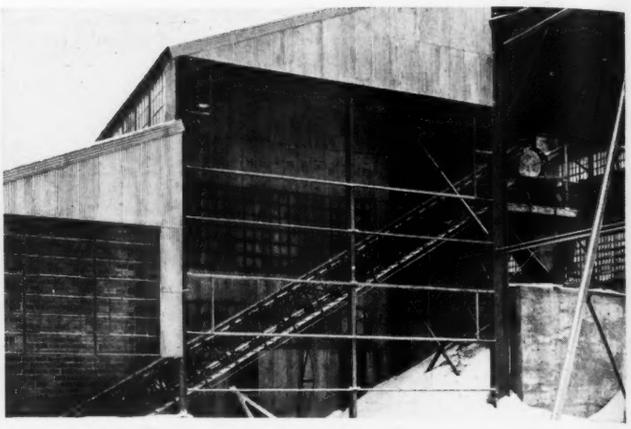
On this floor an automatic bag tier made by the Bates Valve Bag Co. had just been installed when the plant was visited. This



Cement cooling, dust-collecting installation on finish mills' output



Provision for outdoor clinker storage



Conveyor for putting clinker in storage

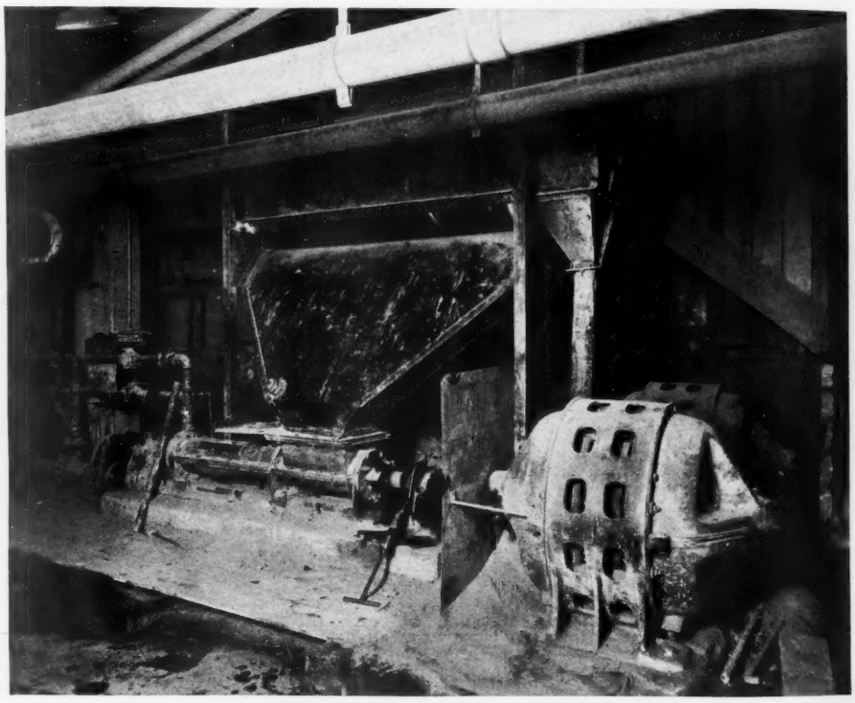
machine ties about 22,000 bags in a 10-hr. day and takes the wire for ties from a coil. It can tie more sacks than the operator can feed, although he has only to slip them into a slot. Another man stands by to bundle the sacks and take them away. A correct tally is insured by an automatic counter which works only when the machine makes a tie.

A good feature of the tie made by the machine is that the ends of the wire are brought together in a closed loop, obviating the danger of hurting the hands when the sacks are being handled.

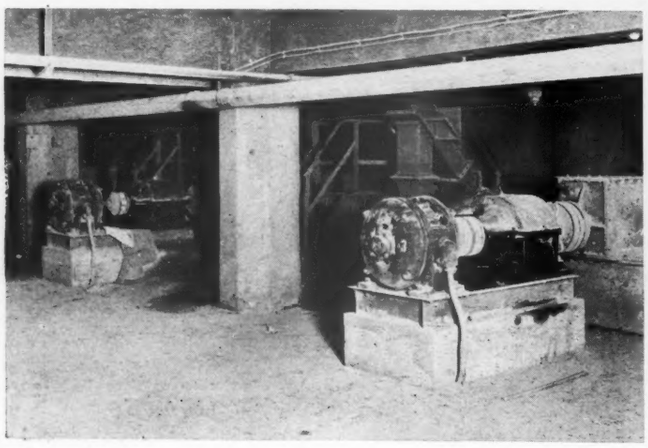
Electrical Equipment

All the electrical equipment of this plant, except the traveling crane motors were designed and built by the Allis-Chalmers Manufacturing Co. Power is bought from the Niagara, Lockport and Ontario Power Co., which generates it at Niagara Falls. It is delivered from this company's transformer station near the plant at 2200 volts, 25 cycles. The Federal company has transformers of its own of 1800 k.v.a. capacity to transform from 2200 to 440 volts for the smaller motors.

The main switchboard, in the power house, adjoining the mill building, was built by the Allis-Chalmers Manufacturing Co. It has 17 panels connected to different departments and three blank panels for future installations. Beside it are three panels for the motors of the air compressor. There is also a 46-kw. motor-generator set for supplying

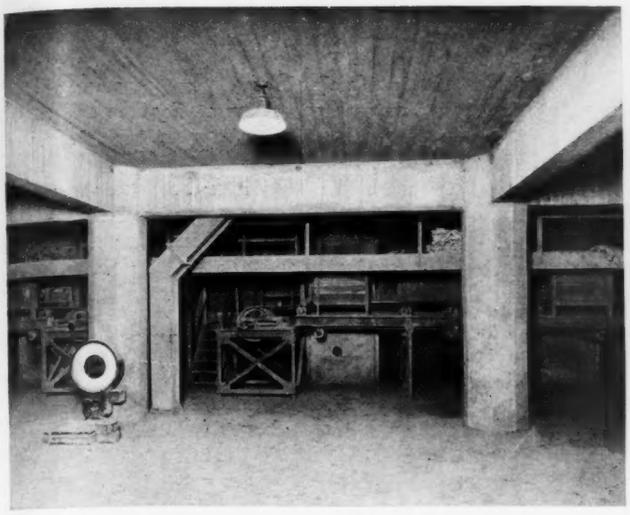


Cement pump taking cement from finish mills

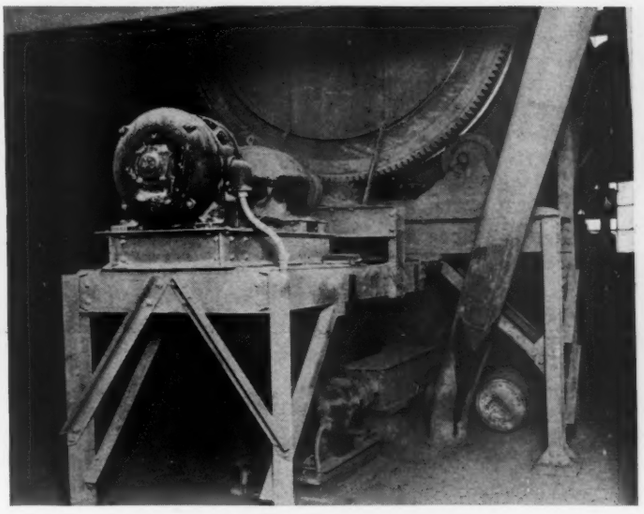


Screw conveyors under storage bins of cement

Dust collector fan in packing plant

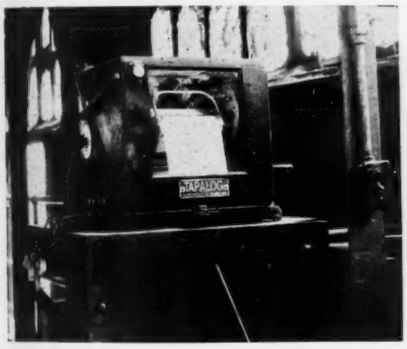


Packing machines in shipping department



Bag cleaner and motor drive

direct current to lights, magnetic pulleys and like work. The motor-generator set for the filter motors, 31-kw. capacity, is in the kiln house. All panels on the switchboard have



Recording pyrometers on kilns

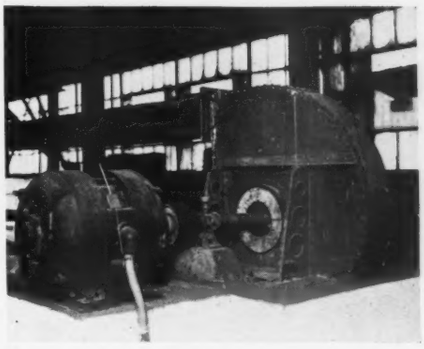
Westinghouse undervoltage and overcurrent relays, ammeters and integrating and recording watt-hour meters. The last named are used in making up the records by which the power cost is allocated to the various departments.

The 500-hp. synchronous motors for the mills are all started at the motor, each motor having its own panel with relays and recording instruments. The exciters for these motors are in the same room as the motors and connected to the starting panels. A current of 67% of the running voltage is used for starting and this comes from auto-transformers set near the motors.

The remaining motors of the plant are of the induction type and the larger ones are started through compensators which give 67% of the running voltage. Each motor has its own fuse box and disconnect switch. The smaller motors are started by being thrown across the line. Most of the starting boxes are of Cutler-Hammer make. The three motors for the air compressors are of the squirrel-cage type and are started through auto-transformers.

All lines are carried underground, the main leads being placed in the tunnels by which the different buildings are connected. The 2200-v. cables are encased in lead.

An unusual feature of this installation is that no auxiliary source of current has been



Fan on coal dryer

provided so that the necessary motors could be operated in case the power should go off. This omission was deliberate and made after consulting the power company which showed

Packing plant for motor-truck trade

Belt conveyors, the ends of which may be lowered

Packing machine drives

that stoppages of more than a few minutes had not occurred in several years. There are two independent power lines near the plant and the plant transformers are connected to both of them and a failure of both lines would be a most improbable occurrence.

Dust Collecting

Dust collecting is important at this plant, as it is in all plants situated near a city. There is little dust produced in crushing and none in raw grinding and the cement dust in the mill room is taken care of by the Sly system of dust-collecting and cooling previously described. The Sly system of dust collecting is also used in the packhouse.

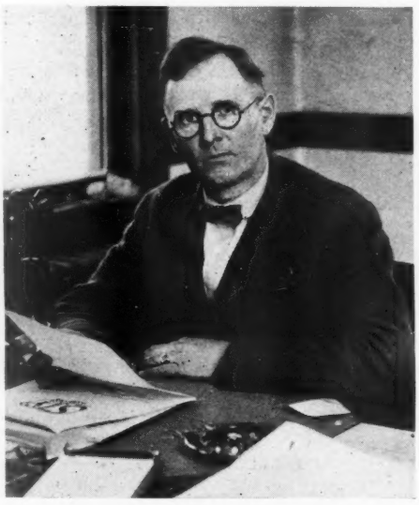
Dust from the kilns is collected in large dust chambers built quite recently. They seem to be unusually efficient, as practically no dust falls in the vicinity of the plant. The collected dust is brought by screw conveyors from the hoppered bottoms of the dust chambers to an enclosed elevator that lifts it to a screw conveyor on an upper floor. Here water is added and the dust and water are so thoroughly mixed in the conveyor that they form a slurry. This is added to the overflow from the filter tanks and so is returned to the kilns.

Design and Personnel

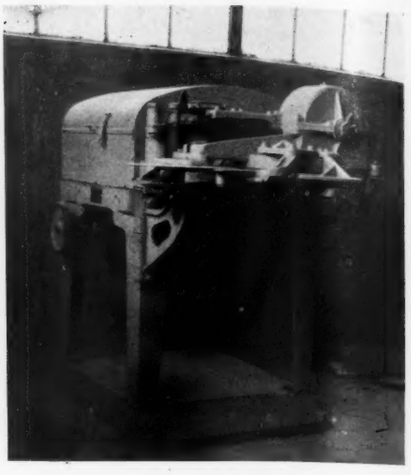
This plant was designed and most of the machinery was furnished by the Allis-Chalmers Manufacturing Co. The layout is compact and in four lines, the packhouse and silos coming first, then the storage, then the mill building and power house and then the kiln house and coal mill. Railway tracks run on both sides of the silos and between the mill house and kiln house, this track serving the coal mill. The site is close to the shore of Lake Erie.

Construction was begun late in 1926 and the plant was put into operation in the latter part of 1927. Some slight changes were made and operation with these changes was begun early in 1928 and has continued steadily since that time.

The grounds around the plant are well kept, trees being left near the lake shore to form a little park, and neat roadways of crushed slag are maintained. Some of the buildings are of concrete block. The coal mill and kiln house are of steel frame and steel siding. The office building is of concrete block covered with portland cement stucco.



S. L. Duvall, superintendent

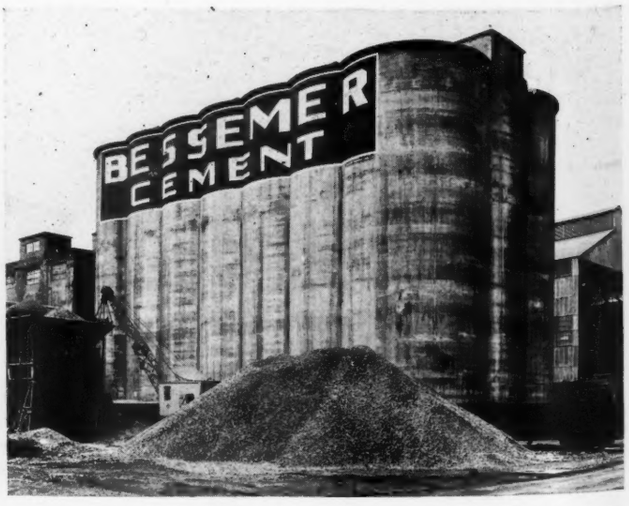


New bag-tying machine

The Bessemer Cement Corp., which takes care of the sales of the Federal Portland Cement Co. plant, has its main office at Youngstown, Ohio. The president is L. A. Beeghly; W. E. Bliss, vice-president; Charles Schmutz, vice-president in charge of sales. All are officers of the Standard Slag Co. of Youngstown, which has about 20 crushing plants in the United States. The Bessemer Cement Corp. also owns the Bessemer Limestone and Cement Co., near Youngstown, and has a large interest in the Peerless-New Egyptian company of Detroit. J. E. Bates is district sales manager at Buffalo.

The Buffalo plant is in charge of O. E. Wasson, general superintendent. S. L. Duvall, who is superintendent, was formerly superintendent of the Youngstown plant. John Schnitzer is chief chemist and J. D. Stokes is chief electrician.

Laboratory of the Federal Portland Cement Co. plant



Cement storage silos of the Federal Portland Cement Co. plant

Crushed Stone Plant Which Washes All Its Products

Plant of the North Shore Material Co. Near Racine, Wis., Uses Novel Methods to Furnish Clean Stone to Meet the City's Specifications

DURING recent years there has been a constant trend toward more rigid specifications and closer inspection of aggregates for use in concrete work. In crushed stone production this has heretofore taken the form of insistence on accurate sizing of the stone, but another feature is entering into the production of crushed rock at the present time. This is a growing demand for washed stone. Already a few plants in widely separated parts of the country are actually washing their products while still others are fitting their old plants or building their new plants so that the washing of stone can be inaugurated when the occasion demands. One of the notable plants that has already begun washing its stone is that of the North Shore Material Co., near Racine, Wis., which has for its market the many populous communities along the so-called "North Shore" of Lake Michigan between Chicago and Milwaukee.

The North Shore Material Co. has an operation turning out about 2000 tons of stone daily from a quarry of good Niagara dolomite. There is a peculiar arrangement of the crushing plant on one bank of the small Root river and the quarry on the other. The stone is brought up the quarry incline and over the river on a bridge of steel trusses. The lower incline is of 16 deg. while the suspended portion over the bridge and to the crushing building is of 12 deg. This arrangement is not an inconvenience at all, and on the contrary the water of the river is advantageously used for washing the material. Since there is no seepage through the stone into the quarry, although it is considerably below the river level, there is no necessity of pumping in the quarry except on account of rain.

Quarry Practice

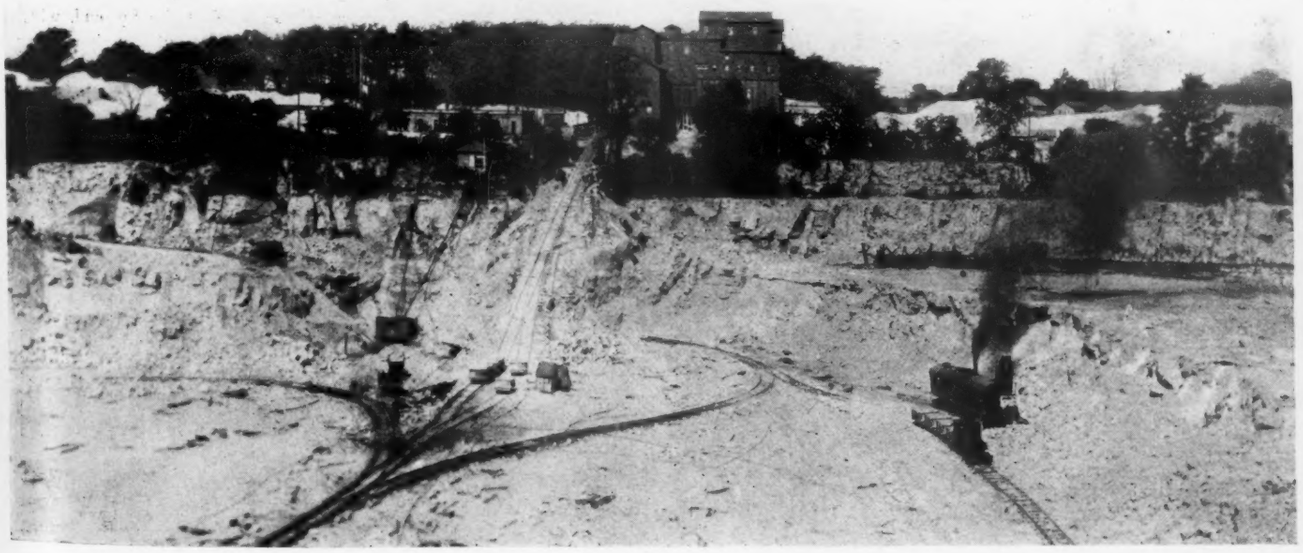
The quarry, set in the angle formed by the intersection of the Root river and one of the main state highways, is hemmed in on three sides so that there is small room for expansion laterally. However, the stone is very good to a considerable depth, and the company is now opening a lower level, and can when necessary go to a still greater depth. The original quarry, which was opened in 1909, had a face of about 50 ft. and occupied the whole angle between the river and the road. The second level has a face of 35 ft. and as yet covers only about one-third of the area of the first level. This lower opening is directly in front of the crushing plant where the stone is the best. Drilling in the quarry is done by four Sanderson-Cyclone well drills, which put down holes to a point 3 ft. below the quarry floor level. The holes are spaced 12 ft. apart with 16-ft. burden, and all of the charge is placed in the lower portion of the hole. No large blasts can be used on account of the proximity of the city of Racine.

There is a quarry track along the entire face of the lower level completely encircling the quarry except at the incline where the rock has not been removed. One main track runs down the center of the quarry connecting with the circular track at the far side, and connections are also made to the circular track at each of its ends. At the incline, the gravity system is used for keeping the full cars directly at the foot of the incline and taking the empties away to a point where they can be hooked on to a dinkey. Standard gage track is used with a heavy rail.

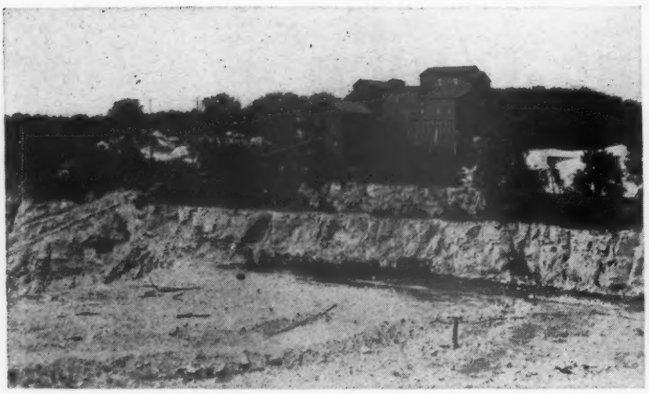
There are two Bucyrus steam shovels for loading. The larger of these is of 100 tons and the other of 30 tons. Both are on caterpillar treads. Loading is done to Koppel 5-yd., end-dump, steel cars, drawn by three dinkeys, two of which are 14-ton Vulcans and the third is an 18-ton Davenport. The quarry equipment also includes a 20-ton Erie tractor shovel which is held in reserve.

Crushing Plant

The cars are drawn up to the plant by a Lidgerwood hoist set on the ground floor of the plant and connected to a 150-hp. variable speed General Electric motor through a flexible coupling. Dumping is automatic to a No. 12 Gates primary crusher driven by



General view of the quarry and crushing plant of the North Shore Material Co. near Racine, Wis., showing the lower level quarry and the track layout



This shows the picturesque surroundings of the crushing plant of the North Shore company

The crushing plant with the unusual dewatering hopper for screenings at the left

a 125-hp. General Electric motor. The material is then taken by a bucket elevator to a 48-in. by 20-ft. scalping screen, the oversize from which passes to a No. 7½ Allis-Chalmers gyratory crusher. The material from this crusher goes to a 48-in. by 16-ft. screen, the stone passing through going to the washing plant and the rejects falling to two No. 5 Gates crushers. There are also Allis-Chalmers rolls for recrushing.

Washing was decided upon at this plant because of the growing demand for clean stone, particularly from the city of Racine, which specifies that only washed stone shall be used in its construction work. Unquestionably the washing of stone has also been an important selling point in the merchandising of the products. The easy access to a sufficient quantity of water due to the proximity of the Root river was also a factor in making the decision for the change.

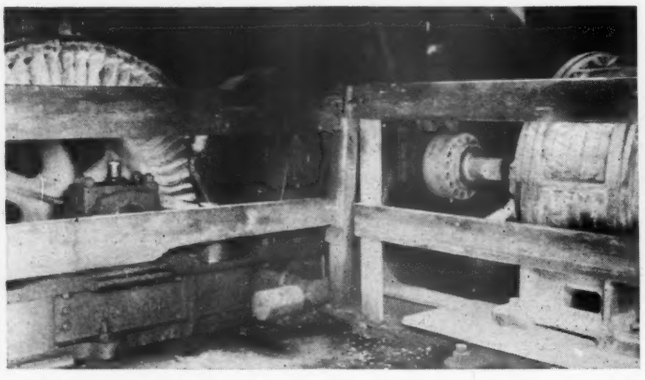
The washing equipment consists of a pair of revolving screens, both of which are equipped for washing, although one is usually run dry. To reduce the amount of washing that is necessary the screenings are removed before the water is added. Water is pumped from the river by an Allis-Chalmers pump rated at 1000 g.p.m.

Sizing is done in four revolving screens and two vibrating screens. The two larger revolving screens, which are 40-in. by 22-ft., are set from the center of the building to the corners, in order to get them into the limited space. The other revolving screens are 40-in. by 12-ft. in size. The vibrating screens were made at the plant. "Rolman" manganese steel bar screens are used on the large screens.

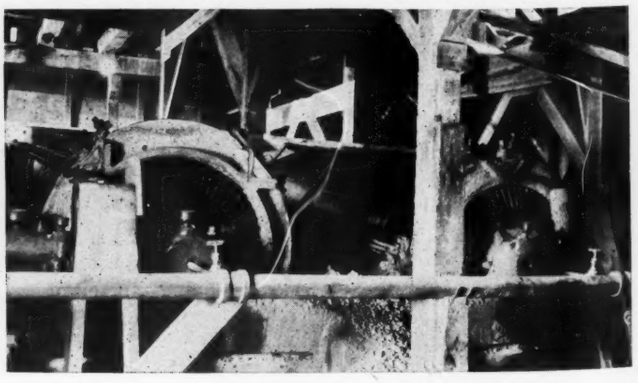
The dewatering hopper for screenings with the settling pond in the foreground

Dewatering the Material

The dewatering system at this plant is both interesting and unusual. It was necessary to rid the waste water from the plant almost entirely of the fine particles of limestone, since the waste was to be returned to the Root river and complaints had been made concerning the discoloration of the river water. There is a country club just below the quarry, and although the milky color of the water could do no harm, it was objected to because it looked badly in the club grounds. The waste water, containing what screenings are left in, flows to a large hopper at one end of the crushing plant. This hopper stands beside a railroad track, and the hopper bottom slopes at a sharp angle toward the track. Gates and chutes carry the screenings to the cars while the overflow passes out at the far end and down a chute to a settling pond. This hopper removes only a portion of the screenings but leaves the discharge still quite milky in color. At first it was thought that by making the outlet of the pond at the far end, which is about 150 ft. from the inlet at the hopper, there would not be a noticeable discoloration. After trying this, however, it was found that there was still a milky color in the discharge, so the use of baffles in the

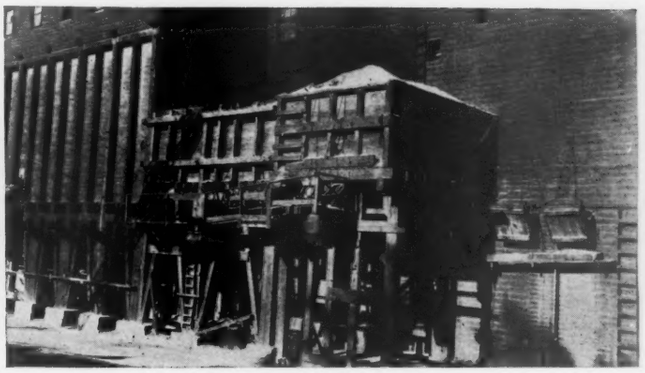


The main hoist for the quarry cars, at the left, driven by the motor at the right



The two large screens in which the stone is washed at the North Shore plant

View from the plant, showing the Root river at the right and the settling pond at the left. The baffles run up to the two posts in the pond



The hoppers with batch boxes for batching material placed beside the regular chutes from the stone bins conveniently for truck loading

bottom of the tank was decided upon. At the end near the crushing plant, baffles have now been installed for the first 50 ft. These baffles have the desired effect of depositing the material, so that the flow in the balance of the pond is practically clear and the discharge is uncolored. That considerable material is deposited here, is shown by the fact that this portion of the pond must be cleaned out about once a week, the material being reclaimed by a Browning locomotive crane having a 1½-yd. bucket. The reclaimed screenings are loaded directly to cars on the track beside the settling pond.

The North Shore plant produces a number of sizes of materials, ranging from screenings up to 8-in. kiln stone. Beside the six bins in the crushing building, there are large storage piles of the various sizes at the plant from which stone is reclaimed by the Browning crane. One of the most important products of the plant is ballast stone for railroads.

Another feature of this plant is the batching equipment which has been installed. Bins have been erected at one side of the plant and batch boxes have been installed. The company has no sand at this plant (it operates a gravel plant at Libertyville, Ill.) so that the sand is all shipped in and stocked-piled near the plant, where it can be loaded to the hoppers as needed. With this equipment the company can furnish directly to contractors all the aggregates they require, which undoubtedly is a convenience which is appreciated. Since this plant is only a short distance from Racine, and is connected with the city by a concrete road, it is obvious that a good portion of the output would be trucked out to the various contractors and builders within the city at considerable saving over rail haulage.

A Steady Operation

Although this is not a new plant, it has a reputation of being a very reliable and steady producer. New ideas have been continually installed to keep the operation up to date, and the whole layout was remodeled only a short time ago. One of the big features in its regular operation is the machine shop completely equipped to do practically all of the repair work around the plant, thus eliminating expensive delays due to waiting for repairs and repair parts. The shop is equipped with one lathe, and there is a skilled machinist in charge. All of the equipment overhauling is done in the shop at a considerable saving to the company.

Edward H. Taylor of Chicago is president of the North Shore Material Co. and H. P. Minear is secretary. The operation is directly in charge of Otto A. Cheska, who is vice-president and general manager, and Fred Cheska, the superintendent. The general offices are in Libertyville, Ill., with sales offices in Milwaukee, Wis., and Chicago, Ill.

The North Shore plant showing the settling pond, the dewatering hopper, and, at the right, the large storage piles

Monolith Mid-West Cement Plant Site Picked Years Ago

WILFRED TRUEBLOOD, production manager of the Monolith Mid-West Portland Cement Co., 25 years ago discovered the site of the clay and limestone bed on which the Monolith Mid-West Portland Cement Co. is now building in Laramie, Wyo., according to officers of the company.

Passing through Laramie 25 years ago, Mr. Trueblood happened upon what in cement manufacture is called "true mix" southwest of Laramie, the like of which from point of cement manufacture there is no other known in the world.

Subsequently, Mr. Trueblood, an internationally known chemist, returned from time to time, investigating the field secretly, until convinced of its value as a cement producing area.

He first communicated his find to Coy Burpresident of the company, eight years ago.

"True mix" is exactly the right proportion of clay and limestone required in the manufacture of cement, which is rarely ever found already mixed and then only in small quantities.

In Laramie, a small area has been blocked off by the company for use when the factory opens in about two months. The small area, it is estimated, will last the company 240 years.

The value of the field over the company's field in California is shown in the fact that 40% of the cost of producing cement in California is taken up in blasting and mixing. This will be unnecessary on the Wyoming site. —*Cheyenne* (Wyo.) *Tribune-Leader.*

Sand Settling and Devices for Settling and Classifying Sand

Part VIII.—Commercial Forms of the Sand Drag Continued—Screw Classifiers

By Edmund Shaw
Editor, Rock Products

THE SAND DRAG made by the Stephens-Adamson Manufacturing Co. (Fig. 30) is regularly used with a wooden tank that is made by the purchaser from designs furnished by the drag machinery makers, but it is also made with a shop-fabricated steel tank when this is requested. The design does not vary much from the others that have been described (July 21 issue). The feed is taken in at the center under the chain, and the chain is raised high enough to permit this by being carried on idlers, which rest on a high frame above the tank. The overflow is taken out at the end, and there is a baffle which may be raised and lowered by screws to vary the height of the overflow.

This company makes the sand drag in a great variety of widths and lengths, and its catalog gives full information as to the main dimensions, weights, horsepower required, and the capacities of the different sizes. As the figures of capacity and power apply more or less to all sand drags of this general design, the table is given here except for the figures which apply only to this particular machine:

DIMENSIONS, WEIGHTS, HP. AND CAPACITIES OF SAND DRAGS

Width of Flight W	Centers	Capacity (tons per hr.)	HP.	Weight in pounds
36 in.	20 ft.	50	3	5500
	25 ft.	50	5	6200
42 in.	20 ft.	60	3	5700
	25 ft.	60	5	6500
	30 ft.	60	5	7300
48 in.	20 ft.	70	5	6000
	25 ft.	70	5	6900
	30 ft.	70	5	7700
	40 ft.	70	7½	9400
60 in.	20 ft.	85	5	6500
	25 ft.	85	5	7500
	30 ft.	85	5	8400
	40 ft.	85	7½	10200

The Screw Classifier

What has been said about the relation of slope and speed to capacity and moisture content in connection with sand drags applies with even greater force to the next class of machines to be discussed, the screw classifier, as it is generally called, although it is more often used as a dewaterer or scrubber than a classifier. This machine in the plain screw type, the form in which it is most generally used, is really one of the oldest machines for raising water, the "Archimedian screw." If it is run at a sufficient speed it will raise water as a pump. Working it with a mixture of sand and water at a high speed will therefore give a very moist discharge. On the other hand, this same screw classifier worked at a sufficiently low speed will give a dryer product than that of any machine of which the writer knows.

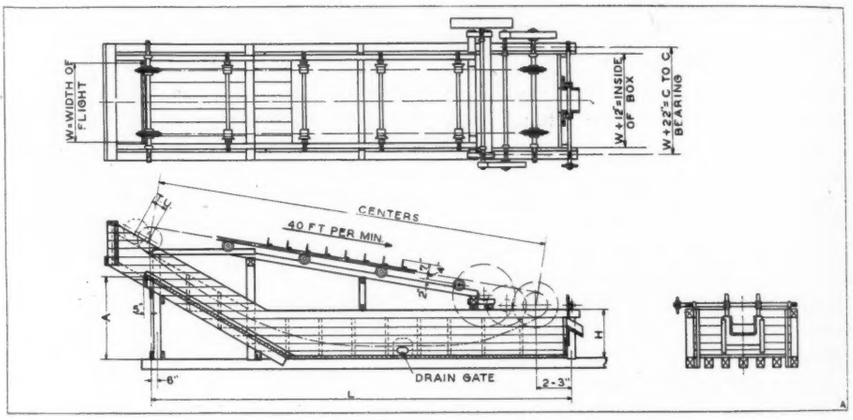


Fig. 30. A sand drag made in a number of lengths and widths

The reason why the screw classifier may be made such an excellent dewaterer is that the screw in raising the sand works it over and over and compacts it as it brings it up the trough. This not only forces out the water in the voids, but it gets out some of the water held by capillary attraction and perhaps some of what is loosely called film moisture. True film moisture, of course, cannot be removed without a great deal of attrition, or evaporation. Researches on true film moisture have shown that it is held to the surfaces of grains by tremendous pressures which cannot be overcome by any ordinary dewatering machine.

Valuable as a Scrubber

This working of the grains is one of the most valuable characteristics of the screw classifier and it has caused the machine to be preferred where a scrubbing action is wanted. It has sometimes been used in this way to follow another classifier or dewaterer, and such a use is a good one. The earliest use of the kind that the writer remembers seeing was at the plant of the Raritan River Sand Co., New Brunswick, N. J., several years ago. It was described in ROCK PRODUCTS, July 28, 1923. The plant was making filter sand and blast sand, and it was desired to have the stock as clean and dry as possible before sending it to the steam dryer, to lessen the cost of drying. To accomplish this the sand and water coming from the regular sand and gravel plant was sent first to one of the automatic sand settlers described in Part V of this series (May 26, 1928). This machine had a relatively large dewatering capacity, but its discharge contained 30% moisture. The discharge went to a double-screw classifier which reduced the moisture to nearly one-half, besides scrubbing and cleaning the grains.

Although the facts are a little outside the discussion, it may be interesting to see just what this would mean in the saving of coal in drying sand. It takes about 80 lb. of coal to dry a ton of sand with 30% moisture to 4% moisture, removing 520 lb. of water. Sand with only 16% moisture may be dried to 4% with only 18 lb. of coal, since there is only 120 lb. of water to remove. The advantages of using a good dewaterer before a dryer are obvious enough, but they are sometimes forgotten in designing plants.

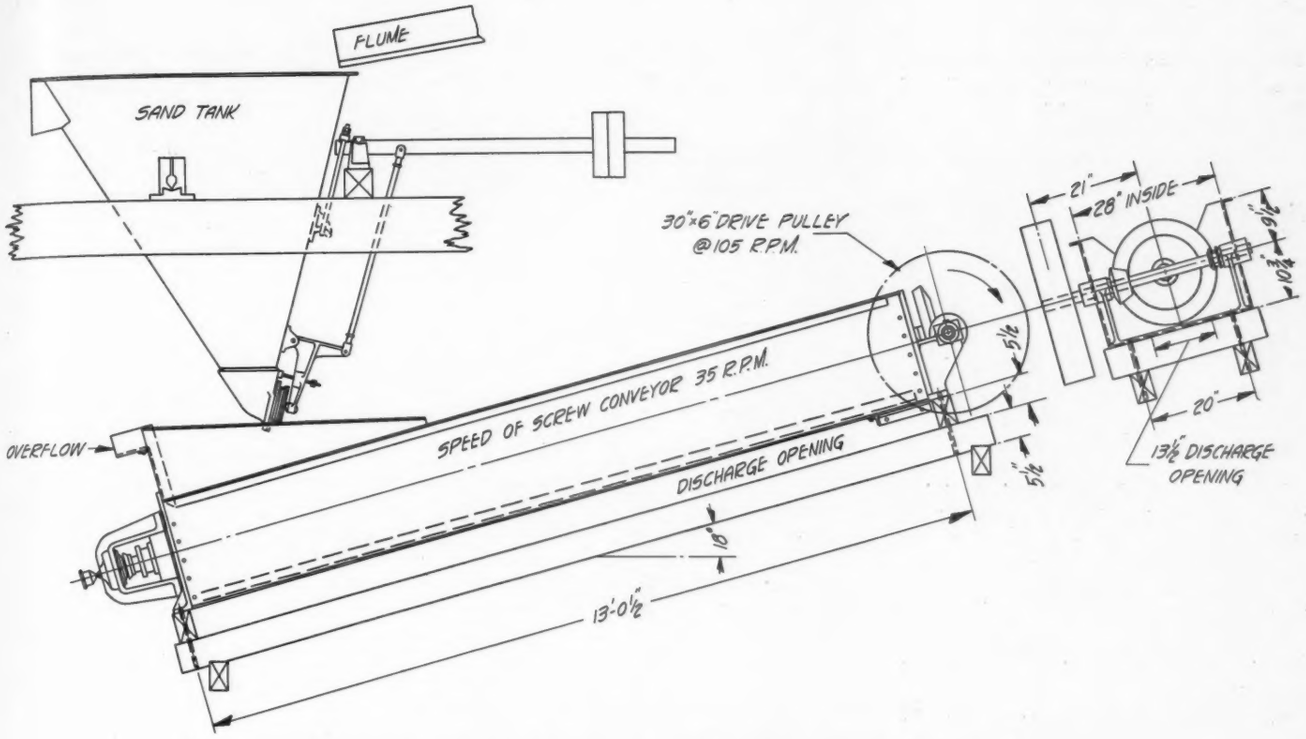


Fig. 31. Combination of automatic settling tank and screw classifier

So far as the writer knows, only one of the many companies that make sand and gravel machinery has put out a combination in one unit of sand settler and screw classifier just described. It is known as the Telsmith sand washer and it is shown in Fig. 31. The automatic sand settler is the Telsmith tank which was described in Part V, and the screw classifier is the ordinary form with a plain screw. The makers say this combination machine has been successfully used in cleaning a very muddy sand dredged from the Kaw river in Kansas.

Forms of Screw Classifiers

There are three fairly distinct forms of screw classifiers used in the rock products industries, the plain screw, the ribbon screw, and the log washer. The plain screw is used more than any other type and in all kinds of sand washing, but it is especially used in silica sand plants, almost to the exclusion of other washing devices. The ribbon screw is not used so much, but the writer has seen it used for washing concrete sand and also for washing the fines of phosphate rock. The third form, the log washer, can hardly be called a sand washer, for it is ordinarily employed in washing the coarser materials, such as gravel and crushed stone. It is used more than any other device on such materials. In the mining field it has been extensively used for many years for washing iron ore. But it will also work very well in washing the coarser kinds of sand, especially where these are contaminated with clay balls.

The plain screw machine, like the sand drag, is made by practically every maker of sand washing machinery, but the designs are so similar a detailed discussion of the machines of different makers is unnecessary, as was done with the sand drag, so only some typical forms will be mentioned.

The machine is made in two forms, the single screw and the double screw, in the same trough. The double screw has the advantage that the sand will not arch in it. With some sticky sand it sometimes happens that the sand will arch over a single screw so that the screw will turn around in a cylindrical hole in the sand without bringing any of it up. But this happens so rarely that for most purposes a single screw will do just as well. The double screw is said to have a slightly greater capacity than two single screws of the same size, although the writer does not believe that this is the case with all sands.

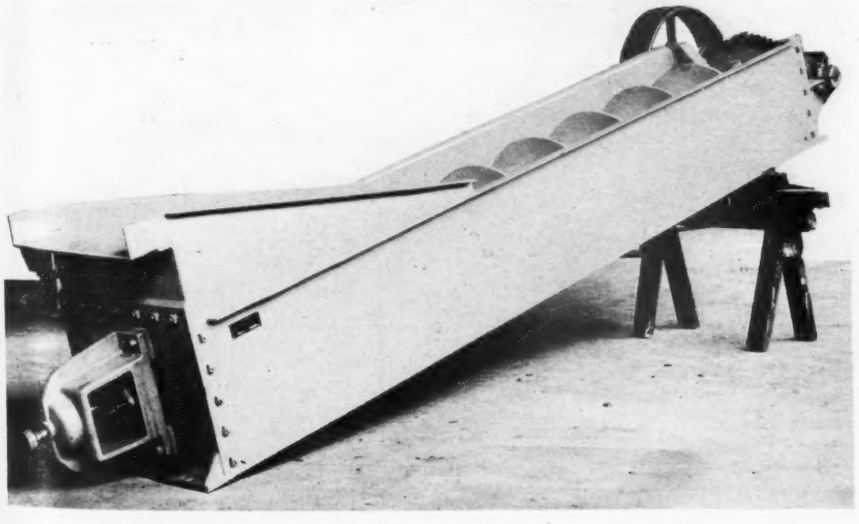


Fig. 32. Plain screw classifier as made by many manufacturers

An illustration of the ordinary type is given in Fig. 32, which happens to be the screw used with the Telsmith washer mentioned above, although its appearance is the same as the machine of many other makers, and so it will serve to show the construction details. The body consists of a steel trough or long box (sometimes this is made of wood), which acts as a settling basin. In the center is the screw which drags out the settled sand. As in the sand drag, the slope is important; the greater the slope, the dryer the product, up to a certain point. In the machine shown the makers use a slope

of 18. deg. from the horizontal.

In the ordinary machine as shown here the feed is taken in at the center and the overflow goes out over a "tailboard," as in the sand drag. The sand is carried out of the water and over a part of the trough that corresponds to the drain-board in the sand drag. Sprays may be added at this point to give a rinse, as in the drag machine.

The screw is made up of flights cast separately, which are slipped on a shaft to make the completed screw. A journal is turned on the shaft at the lower end and this goes through the end of the trough and then passes through a stuffing box and into a bearing. The stuffing box with its packing rings prevents any water leaking out and also prevents sand from cutting out the bearing.

The other end of the shaft is held in a plain bearing and projects through and carries a large miter gear at the end. The pinion for this gear is carried on a short cross shaft. On the end of this cross shaft is the drive pulley or sprocket, if the machine is driven by a chain. The whole mechanism is simple and there is nothing about it to break loose.

In the double-screw machine, which is shown in Fig. 33, as made by the Allis-Chalmers Manufacturing Co., the mechanism is somewhat different. The two shafts have special end bearings with manganese steel bushings. At the other end both shafts carry large spur gears which are meshed so that when one shaft turns the other turns with it. One of the shafts is connected through a universal joint to a short horizontal shaft which carries the drive pulley, or, in the example shown, a large sprocket for a chain drive.

The plain screw classifier has probably been studied and developed as fully as possible by the Lewistown Foundry and Machine Co., which has been manufacturing it for a good many years under the name of the "Lewistown sand washer." This company specializes in the design and construction of silica sand plants in which screw classifiers are so much used. It has made them in larger sizes than usual, up to 27-in. screw diameter. Most of the machines of other makers have screws of 16-in. and 18-in. diameter.

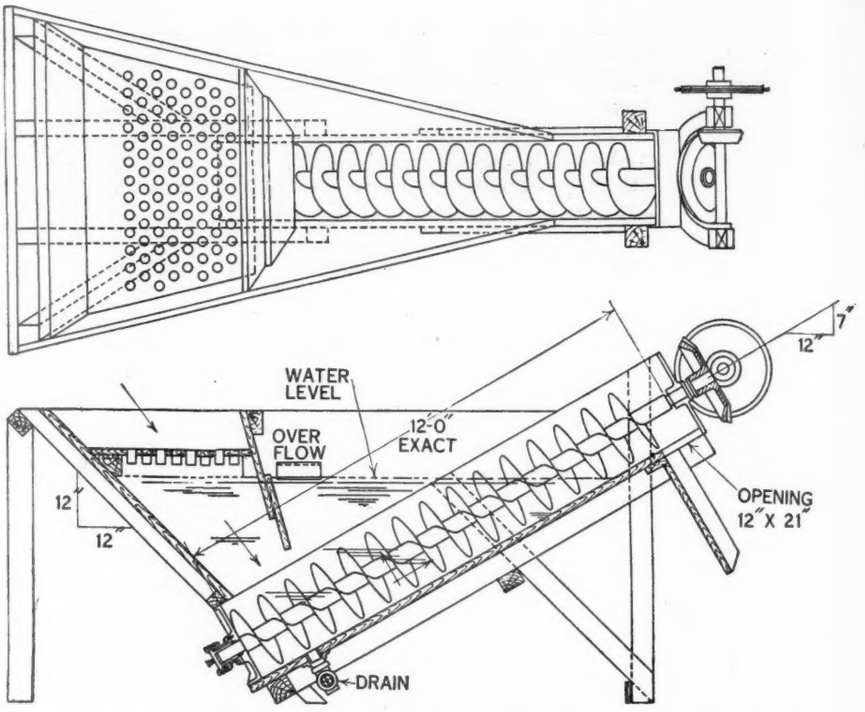


Fig. 34. Unusual screw classifier with steep pitch and special feed and overflow arrangements

In silica sand plants designed by this company there are three or four screws run in series. It is necessary to wash silica sand much cleaner than concrete and building sand; in fact, washing in a silica sand plant might be said to begin where it leaves off in ordinary sand plants. The continued scrubbing and rinsing given by several screws in series removes the material adhering to the grains (sometimes very tightly) and leaves the impurities in such small amount that

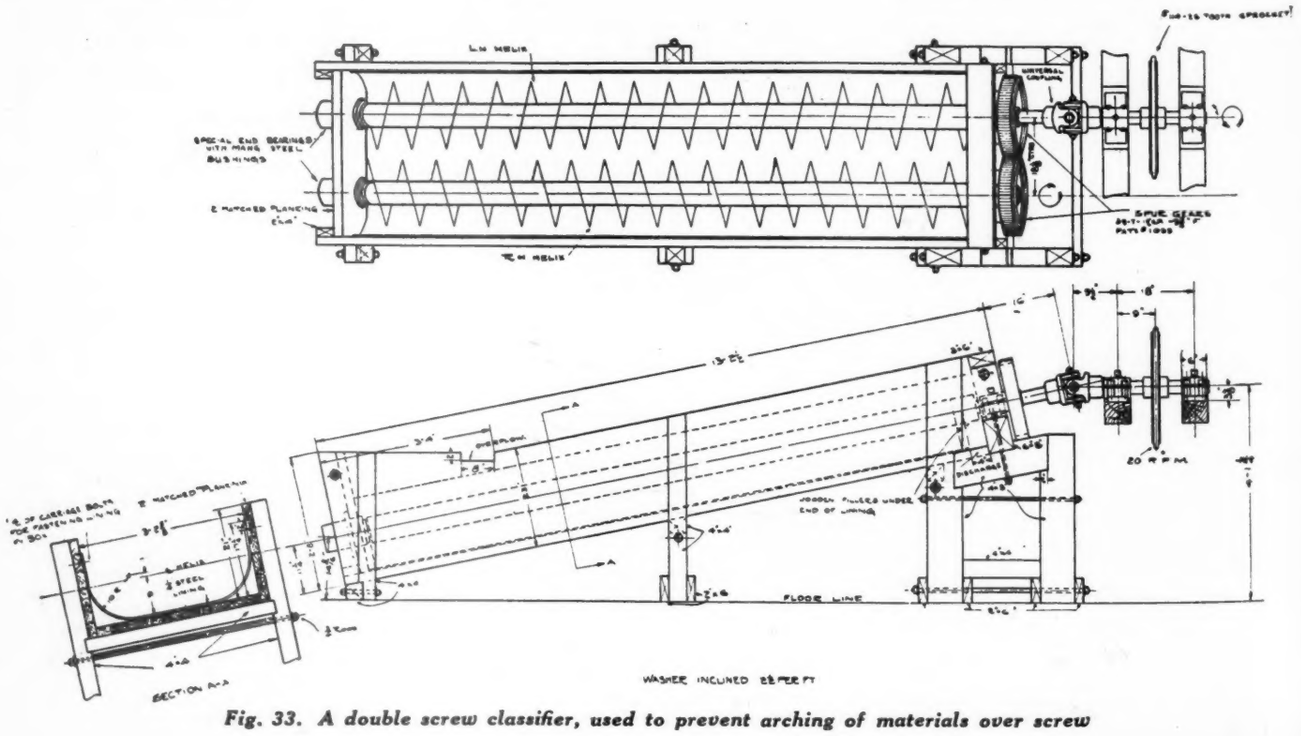


Fig. 33. A double screw classifier, used to prevent arching of materials over screw

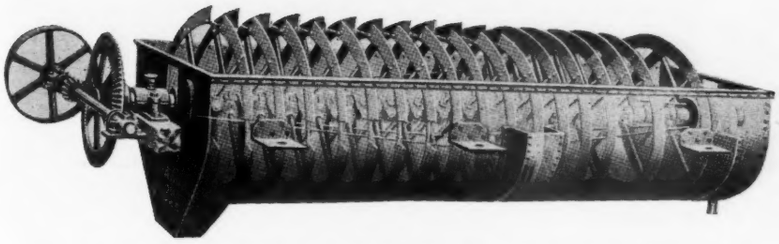


Fig. 35. Classifier using a ribbon screw which is also a double screw

they are reported in hundredths of a per cent.

A screw classifier that shows a great variation from the other types mentioned is shown in Fig. 34. It is made by the Link-Belt Co. The screw is given a high slope, about 25 deg., and the trough is of a form that flares out to form a settling tank of considerable width and area. The feed is taken in at the end through a large coarse screen that serves to break the impact of the flow as well as to keep out any large pieces. The overflow is taken off at the side, and a baffle between the feed and the overflow insures that all the sand must sink down to the screw instead of flowing across to the overflow.

Ribbon Screws and Log Washers

Ribbon screw machines have not been used much in the rock products industry, and with one exception those that the writer has seen were home-made. There was no difference between them and the ordinary type of plain screw washer except that a ribbon screw was employed. The ribbon screw is much used as a conveyor with sticky materials, where a plain screw would fill up with materials adhering to and building up on the shaft. It is used with the same materials in the ribbon screw classifier. It has not quite as much capacity as the full screw, and it is perhaps not quite so strong, and these facts may have kept it from coming into more general use.

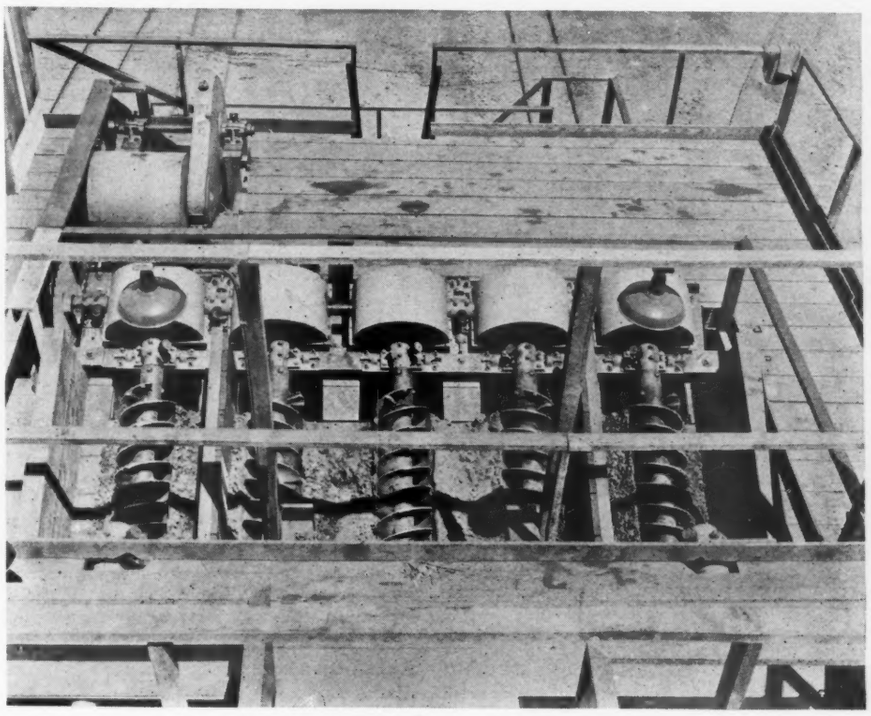
There is one type of ribbon screw machine which has been used a great deal in the mining field and to some extent in the washing of phosphate rock. This is the Aikins classifier, made by the Colorado Iron Works and shown in Fig. 35. It differs greatly in appearance from the other screw classifiers, for the screw is very large and the trough is rather flat to accommodate a screw of large diameter. Those which the writer has seen in use gave exceedingly dry products, but the screws required considerable power to drive, accounted for by the dry condition of the pulp.

This classifier is something more than an ordinary ribbon screw conveyor in a trough, for the screw is single and continuous in the part that is under water and double and interrupted in the part that is out of water. This is presumably to give better drainage.

The Aikins machine is primarily a classifier and capable of very good work in making a close separation. Several examples are given in the makers' literature, from which the following is taken because it gives the products on a 48-mesh split, which is about what would be wanted in washing concrete sand and some other rock products:

Screen	Feed	Sands	Overflow
On 20-mesh	24.2	58.5	0.0
On 35-mesh	11.2	27.0	0.9
On 48-mesh	4.9	7.6	2.6
On 65-mesh	3.5	2.9	3.9
On 100-mesh	4.3	1.7	6.2
On 150-mesh	4.6	0.8	7.2
On 200-mesh	3.1	0.3	4.9
Through 200-mesh	44.3	1.2	74.3

The log washer, as has been stated, can hardly be considered a sand machine, but a brief note of it is included here for the sake of completeness. The screw is made up of square blades or paddles set on a helix around the shaft to form an interrupted screw. Fig. 36 shows a drawing of the machine (with most of the blades left off) as made by the Stephens-Adamson Manufacturing Co. The log washer is made single and double.



Screw washers in a silica sand plant in series. These are made up to 27-in. diameter

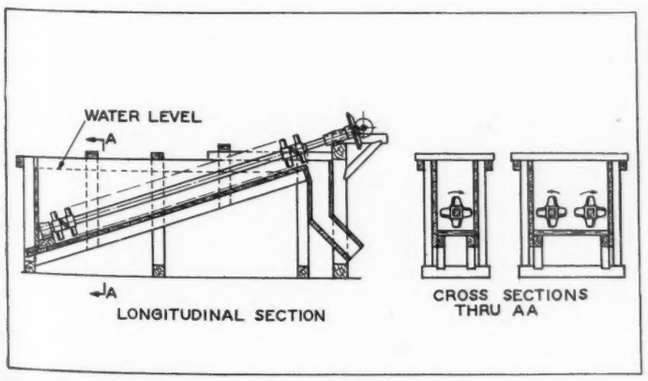


Fig. 36. The log washer. Only a few of the blades are shown

Capacity and Power Requirements

The descriptions which have been obtained from the various makers of screw classifiers do not state the capacities of the different sizes, nor the horsepower required. This is presumably because these vary so much under different working conditions. The machine will produce a dry product, but the dryer the product the harder it is to turn the screw and the more power is therefore required. The machine may be said to have less capacity than the sand drag for the same power requirement, but the extra power goes into dewatering and scrubbing. Where these are important the use of more power is justified.

Fire Resistance of Sand-Lime and Concrete Brick Walls

A SERIES of fire tests of brick walls was completed recently at the Bureau of Standards. The object was to determine the fire protection, strength, and stability under fire conditions of this construction. An item giving the results for clay and shale brick walls was published in *Technical News Bulletin* No. 124 (August, 1927). The present item gives the results for sand-lime and concrete bricks.

Materials and Test Specimens.—Sand-lime and concrete bricks from two sources for each were included. The harder sand-lime brick would be graded as medium under present specifications of the American Society for Testing Materials, and the other as soft, mainly on the score of absorption, the compressive strength on edge ranging from 1690 to 4720 lb./in.², and the modulus of rupture from 460 to 930 lb./in.² The concrete bricks would pass the present A. S. T. M. tentative specifications for concrete building bricks with some margin, the average compressive strength flatwise being 2780 and 2920 lb./in.² for bricks from the respective sources. The aggregate used for both the sand-lime and the concrete bricks was siliceous sand. The bricks were built into walls 16 ft. long and 10 to 11 ft. high for tests in the large furnace and 4 ft. wide and 4 ft. high for tests in the small furnace, eight tests being made with walls of each size. Sand-lime and concrete bricks also formed part of six walls subjected to fire and water tests.

The walls were laid up with portland cement-lime mortar consisting of 1 : 1¼ : 6 by volume of cement, hydrated lime, and dry sand, respectively, which was mixed with water to the consistency required by the masons. The bricks were laid flat, as in common or running bond, with one full header course for very five stretcher courses.

Method of Testing.—The walls were built into movable frames, and for the test were placed to form one wall of the furnace chamber. Some of the walls were built solidly into the frames, which were rigid enough to restrain the greater portion of the expansion of the wall during test, thus duplicating conditions where fire division walls are built between two heavy floors and columns. Six walls were tested under a working load of 160 lb./in.² of gross area, maintained constant during the fire test, to determine the adequacy in this particular. Other walls were built free from the containing frames at the sides and top, permitting free movement of the wall during test, which is representative of the unrestrained condition of walls in minor buildings, or the top story of walls in higher buildings, where light, non-fire-resistive interior, and roof construction does not appreciably restrain the wall at the floor and roof lines.

The furnace temperatures were controlled to conform with standard American fire-testing practice, the fire exposure being continued in the fire-endurance tests until or past the time when certain given temperatures obtained on the unexposed side, unless failure under the applied load occurred earlier. In the fire and water tests the walls were exposed to fire for one hour, after which they were pulled away from the furnace and a hose stream from a 1⅛-in. nozzle under a water pressure of 50 lb./in.² applied over the hot side.

Stability and Load-Carrying Ability.—The deflections of restrained and loaded walls were toward the fire and attained a maximum at the center of the wall. For 8-in. walls the maximum deflections of the large walls averaged 2 in. and for the 12-in. walls 1¼ in., at from two to six hours after the start of the test. For the unrestrained walls the maximum deflections took place at the top of the wall and were away from the fire, the average of maximums obtaining at the end of six hours being 9¼ in. for 8-in. walls. The recovery from deflections on cooling ranged from one-fourth of the maximum obtaining during test to full recovery.

No 8-in. walls failed because of excessive deflection or under the applied working loads. One 12-in. wall of soft, sand-lime bricks failed under the working load at a little before 10 hours after the start of the test through weakening of the brick on the fire side. It is probable that few fire conditions in buildings will give rise to fires as severe as 10 hours of the standard fire test.

Fire Effects on Brick Masonry.—For the restrained walls, cracks on the side away from the fire of over 1/16 in. in width were rare. For the unrestrained walls, cracks up to ⅝ in. were formed in 8-in. walls toward the end of the test, these being narrower or closed on the fire side. The headers were seldom found cracked in the central portion of the wall, so that the integrity of the wall as a building member was maintained.

Serious damage to the bricks was confined to those next to the fire except for tests lasting over six hours. Cracks parallel with the face of the wall were formed in some of the bricks from ½ to 1½ in. from the fire side. Hard bricks were more susceptible to cracking than the softer bricks, although showing greater strength after the fire test. The full discussion of fire effects and possibility of reuse involves a greater amount of detail than can be given in the present item.

Fire-Resistance Classifications.—The temperature rise permitted is 139 deg. C. (250 deg. F.), or a maximum rise of 181 deg. C. (325 deg. F.) for any single point. The temperatures are measured under asbestos felt pads, 0.4 in. thick, placed against the unexposed side of the wall. The periods given in the table are determined by temperature transmission unless otherwise noted. The limit for the 12-in. walls is determined by load-carrying ability for walls made from some of the bricks. The periods given are within the lower range of values obtaining in the fire-endurance tests.

The factor of safety that should be applied to these fire-resistance periods depends on the variation in material and workmanship to be expected in building construction beyond that present in the tests. The drier condition of party and fire walls after years of service in the interior of heated buildings, as compared with that of the walls tested, and the increase in temperature on the unexposed side after the prescribed temperature limit was reached and the fire shut off would, of course, influence the choice. Some information on the extent of these effects was developed in the tests. The use of factors of safety of 1¼ to 1½ on the results of fire-endurance tests has been advocated. In so far as it concerns the constructions tested, the higher value does not appears to give a greater margin than necessary. On this basis a wall giving an ultimate fire resistance of three hours can be applied as protection against a fire condition equivalent to not more than two hours of the standard test, as a wall of nine hours test rating to a fire condition estimated as not more severe than six hours of the test furnace exposure. The fire and water tests developed nothing that would change the conclusions based on the fire-endurance tests.

The periods apply for both bearing and non-bearing walls unless otherwise indicated. Those marked with a reference (†) in the following table are only to be used for non-load-bearing walls when the probable exposure approaches the period given in the table. However, such walls are safe for bearing purposes for lower periods. For brick laid flatwise and for periods not exceeding six hours, either portland cement, cement-lime, or lime mortar of volume proportions not leaner than 1 : 3, cement or lime, and sand, respectively, can be used. For walls having periods of over six hours, portland cement or cement-lime mortar should be used.

When combustible floor members enter into solid walls, the periods are premised on the assumption that they project not more than 4 in. into the wall, and, where entering from both sides, that they are so placed and protected as to have not less than 4 in. of solid masonry between them.—*Technical Bulletin* of the U. S. Bureau of Standards.

ULTIMATE FIRE-RESISTANCE PERIODS OF SOLID CONCRETE AND SAND-LIME BRICK WALLS

Kind of brick	Nominal thickness	Building members projecting into wall	Fire-resistance period, hours
Concrete..	8-in. unplastered	None, or incombustible	6½
	do	Combustible	3
	12-in. unplastered	None, or incombustible	15
	do	Combustible	12½
Sand-lime	8-in. unplastered	None, or incombustible	8
	do	Combustible	3½
	12-in. unplastered	None, or incombustible	10* 15† 10* 13†
	do	Combustible	

*Determined by load-carrying ability.
†Determined by temperature transmission only and obtained by comparison with results of tests of concrete brick walls.

A Highway Engineer's Opinion of Gravel as an Aggregate for Concrete Roads

Some Recommendations to Producers from the Engineer's Viewpoint

AT the July meeting and luncheon of the Empire State Sand and Gravel Association held in Buffalo on July 20, a very clear and concise statement of the engineer's attitude toward gravel as an aggregate for concrete road building was made by Charles R. Waters, District Engineer at Buffalo for the New York State Department of Public Works. Mr. Waters' talk is unquestionably timely, and certainly contained much that should interest men of the gravel industry over the whole country. His paper follows:

"Nearly all of our proposals for roads in the Buffalo district this year have required the construction of concrete pavements to be laid in and of two courses; that is, pavements having pea gravel tops. I have often wondered if the material producers have been thinking that we are going too far in advancing from the one-course to the two-course job. I believe we are in the right and that we are building a superior pavement. I shall endeavor as I proceed to explain the situation and try to state the reasons for this improved design.

"The standard specifications of New York state require the use of stone in all concrete pavements, and it is only when a permissible note is written on the plans that gravel may be substituted for stone. The experience of the engineers in this district is that a high-class gravel makes at least as satisfactory if not a better pavement than the stone produced in this vicinity. It is my understanding that the Arlington and Bates test roads were made principally of gravel. I believe that Mr. Bixby's investigation of the highways in the North Atlantic States, however, did not point to a superiority of gravel over stone, but we in western New York do not believe his general conclusion fits our conditions and we have therefore incorporated a note on practically all of our plans that gravel would be acceptable for the coarse aggregate.

"In doing this, however, we are not saying that any gravel may be used. We are requiring that the gravel shall be strictly high class. That means that the product must be hard, and we test for hardness in the laboratory in a severe testing machine. We are asking for a percentage of wear of not greater than 12. Nothing but a hard gravel can meet that specification and a gravel containing slate or other soft stone is quickly rejected. Everyone knows that a concrete pavement, exposed as it is to the weather and to all sorts of traffic conditions, must be the best concrete that anyone is able to produce; otherwise, it will not have proper lasting qualities and hence would prove an economic loss.

"The gravel must necessarily be clean. Dirty or coated stone will not make good concrete and will not be accepted. Sand containing organic matter is very detrimental and is another reason for rejection of some materials.

"My personal idea is that each producer should have a man in his plant who understands what our requirements are, and he should not allow a car to leave the plant if he has any thought that it might be rejected on the job. I believe the idea of sending gravel to the job to try it out and see if it will be accepted is wrong and that the producer should be sure of his product before it leaves his plant. If we take several samples of gravel from one plant and we find that the percentage of wear is not below 12, but runs 14 or 15 or above, and then 11 or 12, and then 12 or 13, I am forced to tell the contractor that the gravel from such a pit is of questionable quality, in so far as our specifications for concrete pavement are concerned, and he may find many delays in his paving operations if he attempts to use such a product. It may be unfortunate that all gravel will not meet our specifications, but this is not the fault of the engineer, and, as I said before, if we cannot have a high-class gravel, then we do not want any gravel—we only want a gravel product that compares, by the universal and standard testing methods, with a high-class crushed stone product.

What the Engineers Want

"When the product is received on the job we want it graded. We do not want the large sizes in one end of the car and the small sizes in the other end. We might overcome this when the material is stock-piled, but it often happens that the material is unloaded immediately from the car to the hopper. This would make one batch of concrete of large stone and the next of small stone. The place to mix the various sizes so as to properly grade them is at the producer's plant, and to do so is not a difficult task. Here is another job for the material inspector or supervisor that I have suggested. Another reason why I think you should have a material supervisor is because such inspection would be this man's entire job. Your plant superintendent has many other things on his mind, the principal one of them being production. The place to have the check on your product is at the time of production rather than after you have paid the freight to destination.

"The state is not in position to adopt a policy of having an inspector at each plant—it would take too many men. We inspect the materials at the place they are to be used, which, outside of our sampling, is the proper place to say whether or not the materials are satisfactory.

"We are down to some pretty fine points in the laying of concrete pavements and reinforced concrete structures. We are very apt, I think, to become more rigid and more exacting. The tendency in the concrete world is all that way. Some of the large users of concrete are many steps ahead of us. We are now giving consideration to the bulking of damp sand, and we will, if I am any prophet, soon be testing gravel or stone for soundness as well as abrasion. We now measure our gravel by volume—probably the next step will be to weigh each batch. They are weighing their materials in some of the other state highway departments. I should not be surprised to see the inundation process for sand come into general use quickly. Years ago we were working by rule-of-thumb methods, but today, we think, at least, that we are quite scientific, and I believe the tendency is for more science and technique. This is entirely right and proper, for we are trying to make the best concrete that can be produced, because it is subjected to the most trying stress, strain and atmospheric conditions that any concrete can be subjected to, and anything but the best will not make lasting pavements.

"Last year we laid a total of about 75 miles of pavement in this district. This amounted to approximately a million square yards of pavement. The total money involved in this work, including the part paid by the counties, is upward of $5,000,000. Our work is expanding all the time. The building of bridges is new to the department, and these are taking large quantities of materials. The grade crossing work will be under way shortly and will also require much material. The Niagara Falls boulevard for which bids were recently advertised will use about 25,000 tons of coarse aggregate and about 18,000 tons of sand. This one job will use over 50,000 bbl. of cement. I figure that one year's program in this district requires about 250,000 tons of coarse aggregate and 150,000 tons of sand. This transferred to carloads of materials means 12,000 to 15,000 carloads of aggregates. When you consider this is for one district only and that there are nine districts in the state, you will readily see that you need not expect to run out of work right away.

Work on Two-Course Pavements in Progress

"I am in hopes that sand and gravel producers will be able to go out and inspect some of the construction work of this district which is now in progress. The nearest job to Buffalo is at the city line on the Lake Shore south of Lackawanna. They have just finished pouring on the new Millersport road off Bailey avenue just north or west of Main street. Both of these are two-course jobs. On the Lake Shore road the bottom course is of slag. The Millersport road is gravel throughout.

"There is nothing particularly difficult about the two-course work. It is simply laying a top of pea gravel on a base of larger aggregate. In other words, it is laying a bottom course of the regular mix and placing on top of it a layer of concrete of a richer mixture, using a smaller sized aggregate. Our usual practice is to lay 6 or 7 in. of base No. 1, 2 and 3 size aggregate, 1-2-3½ or 1-2-4 mix, and a top of pea gravel 2 in. in depth. The mixture of the top is 1-1½-2. The cement factor runs about 1.6 for the base and 2.2 for the top. Due to the greater quantity of material in the base, the total quantity of cement used is not much greater than the amount used in the ordinary one-course pavement. We have incorporated in the plans a note that the base may be made of stone, gravel or slag.

"When our first two-course contract was advertised some of the contractors inquired as to what sort of notion this could be. Was it simply a scheme to cost the contractor more money? One of the contractors who made this inquiry was a successful bidder on the job, and a few days ago he told me that he encountered none of his anticipated troubles and, as a matter of fact, he liked it in comparison with the one-course type. He had found it easier and cheaper to manipulate, screed and finish. The "kink," if you please, in building a two-course pavement is a matter of organizing the transportation of the aggregates. It is necessary to bring up several bottom course batches to every one for the top course. In reality we have been building two-course pavements for years on every job where the base has been screeded to place the reinforcement. The only important extra equipment is that a second measuring hopper is needed. Materials for both courses cannot be put through the same spout. On the road, batches for both courses are put through the same mixer—only one mixer is needed. The difference at the mixer is that the operator has to change the gauge on the water tank when he changes from the bottom to the top course.

"We expect to obtain from this type of pavement a denser, more impervious surface of smoother riding qualities and greater durability. There is no gainsaying the fact that if we can build a pavement that does not scale or disintegrate we will be doing something of great benefit to the road building industry. Erie county has been building this type of road for several years, and if you inspect some of these roads I think you will agree with me that it is proper to give this method a fair trial.

"The Lake Shore road and the Millersport road that I spoke of are both 9 in. thick and are laid on a 6-in. foundation course of slag or gravel. These pavements do look strong. When we remove portions of our old 5-in. and 6-in. concrete pavements I often wonder how they have given the service that they have rendered. These 9-in., two-course pavements on a foundation course of consolidated materials look like something, and it seems to me that they ought to have a life in excess of the normal expectancy.

Buffalo Builds Wide Roads

"I should like also to call your attention to the wide pavements which we are building in this territory. We have several roads 30 ft. in width composed of three 10-ft. lanes, and we are building a number of 40-ft. pavements with curbs and sewers just like city streets. It will be only a short time in the future when all the main traveled routes will be copies of city streets. The Lake Shore road has a peak of traffic of more than 25,000 vehicles per day, and nothing less than four 10-ft. lanes will handle such a volume of traffic. Main street carries for days at a time more than 15,000 vehicles. Now there is a 40-ft. pavement on Main street from Williamsville to the city line. This improvement was not only a great relief to traffic over the old narrow pavement but it increased property values tremendously.

"We just finished a 40-ft. pavement from Niagara Falls to Lewiston Heights, and the Millersport, River road and other roads close to the city are being built in four 10-ft. lanes. I shall be glad to have producers see some of these roads, because of the influence they can exert towards fostering the idea of building wide pavements in all places where the present pavements are so narrow that they cannot accommodate traffic without delays.

"There is no doubt in my mind that the wide roads that are being built in this vicinity will be of great economic and social benefit to the public, and the credit does not belong to any one class. The credit rightfully belongs to everyone connected with the work. Those who furnish the materials of which the roads are made are entitled to as much credit as anyone else. I think we should all take pride in what we are doing and try to produce, each in his own part, the best that he knows how—the designers to make proper designs; the material producers to furnish good products; the contractors to perform workmanship jobs; and the engineers to be fair and reasonable. Thus we will all be happy conducting the various parts which go to make the completed program."

Fresh Water Sand and Gravel Company Increases Facilities

THE Fresh Water Sand and Gravel Co., Ltd., of New Westminster, B. C., a recently formed company, has acquired from G. W. Ross, of Vancouver, a sand and gravel lease on the Fraser river consisting of several miles of river bed, and is now actively engaged in supplying the needs of the construction industries of the lower mainland. Only fresh water material is being taken from the lease. Material used on many of the largest contracts executed on the lower mainland came from the company's new holdings, including the operations of the Canadian-Pacific Railway Co.'s pier B-C. The company also has at its disposal the entire floating equipment of Gilley Bros., Ltd., including also its bunkerage and trackage facilities. Rail shipments are completely handled by a spur line running below the bunkers.

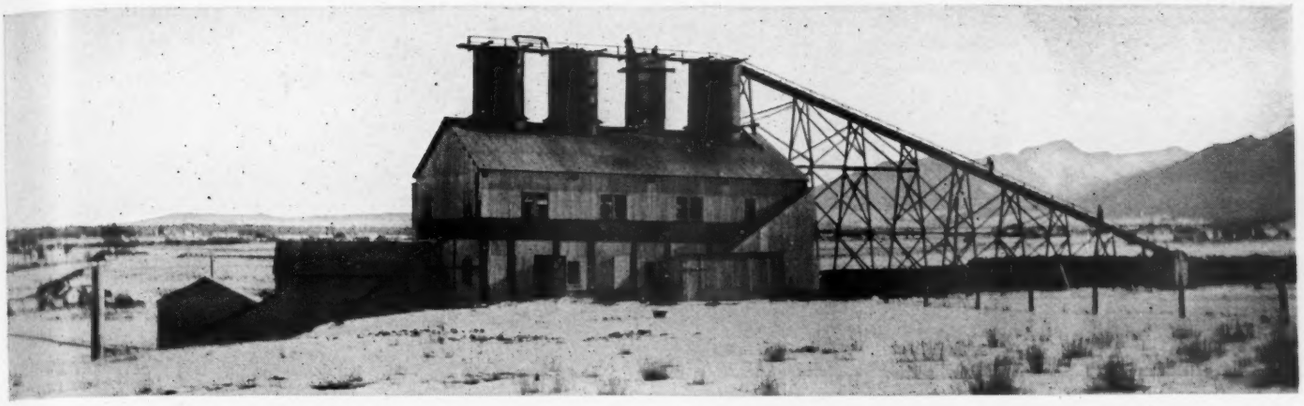
The present capacity of the plant is 600 cu. yd. per day, but steps are now being taken to meet future needs of the company as demand grows. Two years ago Gilley Bros., Ltd., increased their bunkerage facilities considerably beyond the needs of the moment and recent developments have completely justified this move.

Path of Missouri Highway Constructor Not Rosy

AFTER extended research into statistics with reference to history of constructors who have taken state highway contracts in Missouri since 1920 with the idea of inquiring into the cause for the unreasonably high mortality in the business of highway construction, E. C. L. Wagner, executive secretary of Associated General Contractors of Missouri, has found that the average Missouri highway constructor has about one chance in two of remaining in business more than one year.

Although the list of bidders on highway projects continues to mount, each year he finds that fewer and fewer of the "old-timers" are securing contracts. He finds that the major portion of the large number of new bidders being attracted to the field from year to year are (*a*) persons inexperienced in highway construction who are laboring under the delusion that highway work returns large profits; (*b*) young engineers, ambitious to succeed financially, who are familiar with practically every phase of highway construction except the business or financial side; (*c*) persons who have been forced into the business, such as creditors who have loaned money to constructors.

Mr. Wagner's investigations showed, in his state, that the experience of the last seven years is that 53% of the constructors bidding on state highways abandon the field after one year in the business.—*Highway Builder.*



The new plant of the Black Marble and Lime Co., recently completed at Enterprise, Ore.

New Plant of the Black Marble and Lime Company

Oregon Now Has a Thoroughly Modern Lime Plant

THE MOST MODERN LIME PLANT in the Northwest has recently been completed at Enterprise, Ore. The plant consists of three vertical, steel-encased kilns, with the hydrating and ground limestone departments and is located directly on the railroad. The quarry is four miles from the kilns and at an elevation of 2,170 ft. higher. It is planned later to install a tram for handling the rock between the quarry and the plant; at the present time the rock is transported by a caterpillar tractor hauling two Athey trailers; 20 tons of rock is taken at a trip.

The limestone is a beautiful black marble, very finely grained, uniform and dense and of exceptional purity as is shown by the following analysis:

Silica	0.14%
Alumina and Iron Oxide	.21
Calcium Carbonate	99.24
Magnesium Carbonate	.41

This rock takes a beautiful polish and it may become valuable as a black marble. The extent of the deposit is so great as to be practically inexhaustible; there is very little overburden on the rock.

Lime Kilns on Top of Bluff

In designing the plant advantage was taken of a natural bluff, the kilns being located on the top of the bluff and the shipping floor at car level 57 ft. lower than the drawing floor. This makes possible gravity handling and also furnishes economical construction for the storage bins.

The foundation for the kilns and both the drawing and firing floors are of concrete construction so arranged as to give ample room for the storage of coal and for operating the kiln. Three kilns have been erected, two 11 ft. 6 in. in diameter and one 12 ft. 6 in. in diameter, all are 42 ft. high above the firing floor. The foundations are in place for a fourth kiln which will be erected when the output is required. The kilns discharge directly to steel cooling pans; from these cooling pans the lime is carried by a 22-in. belt conveyor (supplied by the Link-Belt Co. and the Manhattan Rubber Co.) to a screen which removes the fine lime. The lump lime is taken by a conveyor to a concrete storage bin having a capacity of 750 tons, from this bin the lime is either barreled or sacked and loaded into cars.

The fine lime passing the screen, or if desired the run of kiln lime, passes through a Sturtevant "open-door" crusher and is taken by a belt conveyor to the fine lime bin. The fine lime bin feeds to an elevator which supplies the Kritzer hydrator, the hydrator discharges to an elevator which takes the hydrated lime to a screen where all coarse particles are removed, the fine lime passing the screen goes to a No. 0 Raymond mill. The finished hydrate from the collector falls into the hydrated lime bin from which it is packed in sacks by a Bates bagger.

Hydrating Plant—Ground Limestone Plant

The plant is also equipped to manufacture

The plant at Enterprise during construction, showing its position on the bluff

ground limestone for the agricultural trade, and is so arranged that the coarse particles removed by the screen between the hydrator and the Raymond mill and the rejects thrown out by the Raymond mill, are taken by an elevator to the ground limestone bin. Any core or imperfectly burned lime from the kilns is sent to the ground limestone bin. The major portion of the material used for the production of ground limestone is supplied by the quarry spalls. The preliminary crushing of the limestone is done in the hammer mill and the finished grinding in an Abbie tube mill.

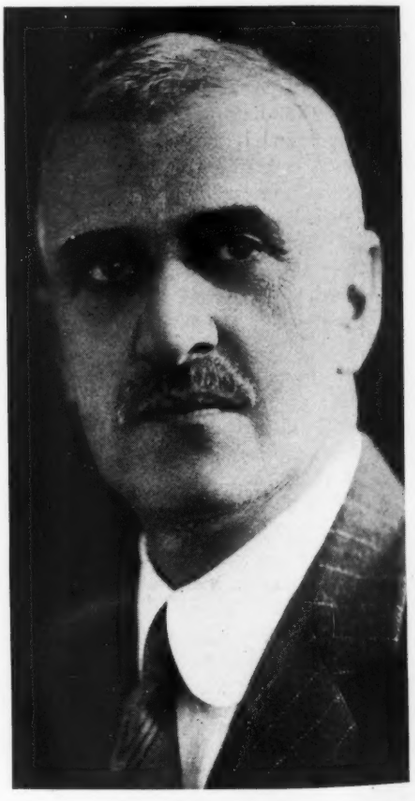
Flow-Sheet

The sequence of the operations is shown on the flow sheet.

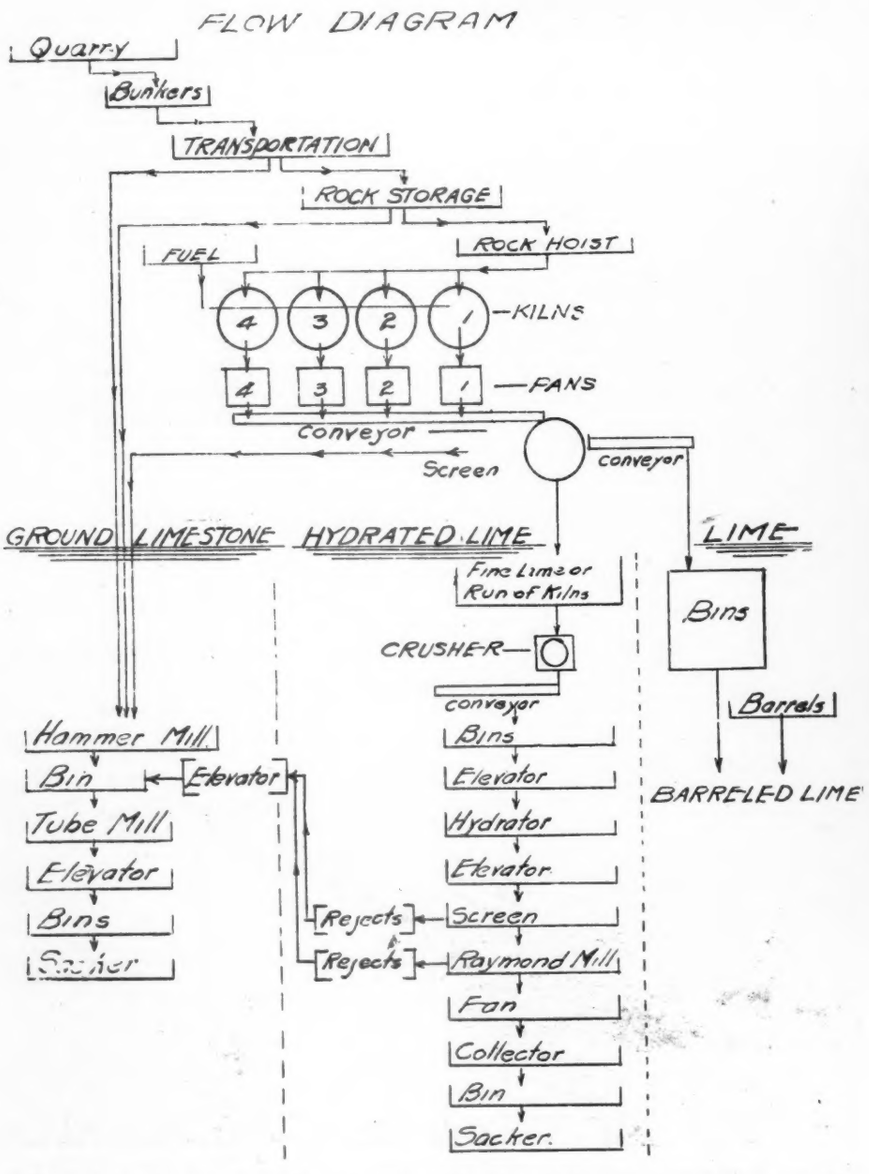
The kilns and most of the machinery were obtained from the International Lime Co. of Sumas, Wash., which ceased operation a few years ago. All machinery was thoroughly overhauled and put in first class condition before being erected.

The new lime plant from the foot of the bluff

The plant was designed by E. W. Lazell, chemical engineer, Portland, Ore.; the erection was under the supervision of Floyd W. Allen, civil engineer, Portland, Ore. The officers of the company are: Charles A. Bingaman, president and general manager, La Grande, Ore.; J. A. Burleigh, secretary, Enterprise, Ore.; Hank McGoldrich, treasurer, Enterprise, Ore.



Dr. E. W. Lazell, designer of the new plant



Flow sheet of the new plant of the Black Marble and Lime Co., at Enterprise, Ore.

The Manufacture of Gypsum Plasters

Leaves from an Operating Man's Note Book—Part VII.—Acoustic Plaster —Health at Gypsum Plants—Miscellaneous Crude Gypsum Products

By W. B. Lenhart

Assistant Editor, ROCK PRODUCTS, formerly consulting Chemist and Engineer, Long Beach, Calif.

WHEN SOUND WAVES encounter a second medium other than air, that is denser, more elastic or otherwise different than the sound waves themselves, the regularity of their progression is disturbed. Part of the sound waves are thrown back as "reflected" waves. Some of the energy is "absorbed" by the deflecting media and the balance is "transmitted."

The term "acoustic plaster" is generally understood by the trade to mean a plaster that has a high coefficient of absorption. The term acoustic should not be used here, as it does not express the use to which the plaster is intended, but a word should be coined that would accurately describe the qualities of the particular material.

If the sound waves meet a wall composed of hard gypsum-plaster, finish coat, backed by several thicknesses of gypsum tile, practically all of the energy will be reflected. Here, then, is another form of "acoustic" plaster, which can be used for sound-proofing or non-transmission of sound. Gypsum plasters have long been recognized as having merit for this purpose.

Porous materials have little reflecting properties, but have high absorption powers. The smaller the cross-section of the air spaces, the greater the powers of absorption up to certain limits. As the air spaces become smaller, the resistance to the sound waves become greater, and a greater amount of the energy is transformed into heat. With a porous material the percentage of sound waves that are reflected is small, leaving comparatively a large percentage to be transmitted. The wall may be made thick enough of this porous material so that the amount transmitted will be practically zero. The ordinary plaster wall of from 5/8 to 3/4 in. thick, made of porous material, will allow considerable of the energy to be transmitted. A wall of this thickness made of the ordinary hard finish will likewise transmit considerable sound, due to vibration of the wall itself. Backing this wall with tile tends to stabilize tendencies to vibrate.

The reverberation or prolongation of sound is perhaps the greatest acoustical defect in theaters and auditoriums. An echo is set up by reflecting walls or surfaces. These two defects are controlled usually by having sufficient porous or yielding materials, thick carpets, hair felts, tapestries, etc., to absorb some of this energy. The cushions and backings on the chairs in the hall help also to control these waves.

The above materials listed for the absorption of sound are faulty to the extent that they are not fireproof, that they afford ideal lodging places for vermin, and in the case of hair felts are apt to be dirty and unsanitary, unless a high quality and expensive grade is used. All of these materials are expensive, are readily soiled, and their life is short.

To replace and to overcome these conditions the gypsum plaster manufacturers have placed on the market various sound-absorbing plasters. It is this class of plaster that is popularly understood in connection with the term "acoustic," and it is this material that the following information covers.

These sound-absorbing plasters should not be used without competent engineering advice, as satisfactory results are not likely. The use of too great an amount of absorbing material will have a deadening effect, and sound waves will be absorbed before reaching distant points of the auditorium or hall. This effect might be worse than the defects that the users are endeavoring to overcome.

This class of plasters is usually mixed dry at the mill, sacked and delivered on the job ready for use. It is only necessary to add water for the mortar.

The basis of practically all gypsum acoustic plasters is fibered hard wall plaster, which acts as the cementing material, and pumice, sawdust, various pulps or any material that will give a wall with a maximum of small air spaces. The amount of cementing and other void-filling products is kept as low as possible. The porous base, if pumice, is usually a sized product, being of such size that all will pass a 10-mesh screen and be retained on a 40-mesh. It is questionable whether the removal of the fines is desirable or not. Every manufacturer and user has his own formula, some are patented, but the basis of all is as above outlined.

In some cases asbestos pulp is added. Others add diatomaceous earths, clay, talc. The purpose of these additions in most cases comes under the head of "hokum," in the writer's opinion, as they add nothing to the plasticity, and their cushioning effect is negligible, especially when the quantity added is considered. Further, by the elimination of these void-filling materials, a more porous wall can be made.

The most serious objection to the use of gypsum base acoustic plasters is, owing to their porous nature, a large amount of water is required for mixing. A very small percentage of the total water added is required for the reaction, and the excess must evaporate. This quantity that must evaporate is so large, and the time element is likewise so great, that by the time the water has evaporated the strength of the cementing material (plaster) has been materially reduced. Unless special precautions are taken, the resulting wall will be worthless on account of its low tensile strength, and the tendency of the surface material to continually slough away.

To overcome this tendency of excess water, indirectly, it is usually necessary to apply the acoustic plaster to a wall previously plastered in the usual manner, which has been allowed to dry out thoroughly before adding the porous media. This dried brown coat then acts to absorb a great portion of the water necessary for mixing. The addition agents mentioned in a previous paragraph likewise have a detrimental effect on the ultimate stength due to this same cause.

Every aid must be given to the wall, that will tend to rapid evaporation of this excess water, such as proper ventilation, and in extreme cases artificial heating. Where the acoustic material is applied to a brick wall which acts to absorb the excess water, good results can be obtained.

It is questionable if mixing at the mill of the dry ingredients is the best course to pursue. It is possible that a higher percentage of voids will be obtained by mixing the cementing material and the porous base on the job. If the ingredients are mixed at the point of application the porous material should be wet first and the cementing material then added. In this case the pores are filled with water only. In cases where the cementing and porous bases are mixed at the mill and then later wetted, the suction, due to capillarity, will tend to fill the voids with the cementing material.

Some manufacturers use, instead of the porous bases mentioned, a product made by granulating slag in such a manner as to get a maximum of air spaces.

At the mill where these products are mixed dry there is considerable wear on the equipment due to their abrasive nature, making repairs necessary at frequent intervals.

It should be unnecessary to add that, for good results, the porous materials, if mixed

at the mill dry, should be all thoroughly dried before mixing with the plaster.

The plasticity of this class of materials is usually very low, and with this in mind as well as the other features discussed, there is room for research to develop a more suitable cementing material than that supplied by the gypsum industry.

The amount of porous material used will usually run between 57% and 60%. Larger amounts give a weaker wall and smaller percentages give too dense a wall. Acoustic plasters made from pumice will cover 80 to 90 sq. ft. per ton and will cost, roughly, 50 cents per yard more than the ordinary gypsum-sand wall.

Another form of acoustic plaster has been placed on the market, the basis of which is the addition of certain chemicals to the stucco, which, when water is added, liberate gases which form the porous structure. The list of chemicals that cause this condition is numerous, all of them being a carbonate in some form or other, that liberates carbon dioxide. Samples of plaster of this type examined by the author set comparatively rapidly, which no doubt is necessary to retain the gas bubbles. The manipulation and application of this rapidly setting plaster would require considerable skill in application under the usual conditions. These plasters have a low tensile strength.

Health Considerations

The different operations required in a plaster mill are conducive to dust, especially in the older mills, and this condition usually causes immediate comment as to the effect of this dust on the health of the men employed, especially with regard to tuberculosis.

The duties of the men employed in a mill of this type are usually so arduous that no man with lung trouble or even a touch of that disease will seek employment, but for the employes to contract any trouble of this nature while working in this dust, it is practically unknown.

There appear to be good reasons back of the opinions that inhalations of small amounts of the dust of gypsum stucco, which is a non-irritating lime salt, into the lungs, in the case of tuberculosis is beneficial. From this source nature gets the lime necessary to wall off and prevent spreading of the infection throughout the lungs.

In fact, in all respects, the general health of employes of a plaster mill is excellent. The writer operated a mill for several years in Nevada and the employes made quite a little settlement, of which it was said, "No graveyard, no doctor, no church, no jail."

Other Crude Gypsum Products

A word might be said regarding the products shipped from the mill in the crude condition, namely, cement rock, agricultural gypsum, chicken grits, fillers, etc.

When possible, and in many cases it is necessary, the material as it comes from the crusher is screened, and the fines from this screening are used for the above purpose. This idea has the advantage that it will remove from the rock any dirt, gypsite or "sugar gypsum" that may be present in the rock, leaving the higher grade material for the better grades of plaster.

Cement rock is usually crushed to pass a ring with an opening 1 in. in diameter. In some cases the fines are removed. In the event that fines are permissible, it is the usual custom to ship sweepings, cleanings, etc., with this rock, care being taken not to include any calcined gypsum, as this might become wet later and set.

Agricultural gypsum is taken from the same source as the cement rock, and it must be ground to a specified fineness. In the Western states the different state agricultural departments have set a minmum fineness, gypsum content, etc., for this class of material. Usually 85% to 90% through a 100-mesh screen will pass all the different state requirements.

Chicken grits are a sized crude gypsum product. Two sizes are usually made, one called "Chick" and the other "Hen" grits. The former is screened to about the size of grains of millet and all dust removed. The latter product is screened to the size of a kernel of corn, with the fines and dust likewise removed.

There is considerable pro and con discussion regarding the merits of this material, and its ultimate effect, but it suffices to say that the chickens eat it readily, especially the first time it is fed them. The various theoretical possibilities as to how the hen can change calcium sulphate to calcium carbonate for eggshell formation is up to the biological chemist. At any event, the birds eat the material, like it, no harm results, so their judgment is probably best.

(To be continued.)

Addendum

IN THE PRECEDING installment of the series of articles on the "Manufacture of Gypsum Plasters" in the July 21, 1928 issue, p. 68, a process of artificially ageing plaster by spraying with water was described. It should have been stated that this process is the invention of S. G. McAnally, superintendent of the Standard Gypsum Co. plant at Ludwig, Nev.; and that he has applied for a patent on it. Thus other gypsum manufacturers are not at liberty to make free use of the process, as the article implied.

Canada Gypsum and Alabastine to Improve South Westminster Plant

AN EXTENSIVE alteration and improvement program, which will involve an expenditure of between $50,000 and $70,000, has been by the Canada Gypsum and Alabastine, Ltd., which recently took over the British Columbia Gypsum Co.'s plant at South Westminster, B. C. The proposed work will require approximately two months for completion, and includes changes in the wallboard manufacturing equipment to permit of the fabrication of "Gyproc" wallboard. The capacity of the plant will also be doubled. When these improvements are completed the company plans to export its wallboard to Australia and New Zealand, this demand having formerly been met by the Montreal plant of the company.

More Details of Idaho Portland Cement Project

FINAL ORGANIZATION of the Idaho Portland Cement Co., financed by more than three-fifths of capital from Spokane, Wash., and with many of the heavy shareholders elected as officers, was complete recently in Pocatello, Idaho.

The officers elected are E. J. Simmons, president; J. Tom O'Brien, first vice-president; J. H. Neill, second vice-president and general superintendent, and J. B. Maxfield, secretary and purchasing agent, all of Spokane.

The board of directors of the new company consists of Mr. Simmons, Mr. O'Brien, Mr. Neill, H. R. Turner of Pocatello, and A. J. Lindsay of Spokane.

The company is incorporated for $500,000, with construction work to begin on the plant by August 15 and to be completed by April 1, 1929.

Chemists have advised the company that the limestone on the property is one of the best beds in the west. The property is nine miles east of Pocatello and consists of 160 acres close to the Union Pacific railroad.

It has a wide territory to serve, as the nearest other cement plants are located in Utah and Lime, Ore. The limestone is used by sugar factories and smelters as well as for cement work. The irrigation projects in southern Idaho and the road building are taking much cement.

Mr. Simmons is president of the General Machinery Co., of Spokane, also president of the National Savings and Loan Association here, which has investments said to amount to more than $500,000 in southern Idaho.

Mr. O'Brien is vice-president of the National Savings and Loan Association and general agent of the Penn Mutual Life Insurance Co.

Mr. Neill is a director and general superintendent of the International Portland Cement Co. at Spokane. Mr. Maxfield is secretary and purchasing agent for the same plant.

The party who motored to the meeting in Pocatello were E. J. Simmons, J. B. Maxfield, J. Tom O'Brien and D. B. Heil, attorney for the company.

The plant will be of the latest type and equipped with the most efficient and modern machinery. The initial capacity will be 500,000 bbl. a year, but so designed will the mill be that additional units may be added on as the demands warrant. — *Spokane* (Wash.) *Spokesman Review.*

Autographs of Nature

X-ray Used in the Identification of Crystalline Substances

By A. N. Winchell and E. D. Johnson
Department of Mineralogy and Geology, University of Wisconsin

THE USE OF X-RAYS in the analyzing of substances is growing every day. However, it is apparent that the full importance of this method of analysis is as yet unrealized. The method is one which found its origin in purely scientific research and has been employed in that field most. With the invention of the General Electric X-ray diffraction apparatus the use of X-rays as a means of such analysis became of practical as well as of scientific value. The purpose of this article is to explain the nature of the method and to demonstrate how, like chemical and physical analysis of substances, it is of great practical importance.

Crystal structure has been studied from various angles for some time, but not until recently has this structure been photographed and photographed in such a manner as to reveal many of its characteristics. The pioneers in this work were Laue and the Braggs.

As has been known for some time, crystals are the result of a definite internal structure. The atoms arrange themselves in planes, while the atoms in a given plane are at definite distances apart. Just what position these atomic planes assume depends on the atoms themselves, and it is through the X-ray photograph that the exact position of these planes and the atoms composing them can be determined. This knowledge is obtained by photographing the X-rays diffracted by the crystal. Originally the Braggs did this by placing a crystal in such orientation that the X-rays were diffracted from some set of planes in the crystal. These diffracted X-rays were recorded on a photographic plate. By repeating the process a number of times the diffraction for a number of sets of planes was obtained. This method, while extremely accurate, has numerous disadvantages: (*a*) it entails a great deal of time and work to orient the crystal properly; (*b*) it requires a separate orientation and exposure for each set of planes; (*c*) it is necessary that a relatively large, perfect and single crystal of the substance be available.

Recently this method has been greatly improved by A. W. Hull. By powdering a substance so as it would pass through a 200-mesh screen, then filling a glass capillary tube with it and passing monochromatic X-rays through this, he showed that reflections from every possible plane in the crystal could be obtained simultaneously. This method has both its advantages and disadvantages. The disadvantages are (*a*) the opportunity for any given plane to reflect is small and therefore long exposures are necessary, and, (*b*) the line-pattern or images from all planes are recorded on the same film and consequently calculations are required to determine to which plane any given line belongs. The advantages are: (*a*) it is unnecessary to orient the crystal, (*b*) it requires only one exposure for all planes in the crystal, (*c*) it is not necessary to have a large, single and practically perfect crystal, which in turn does away with uncertainties arising from imperfection and twinning of crystals, (*d*) it allows a definite numerical calculation of both the intensity and position of each line of the pattern and (*e*) it can be applied to material so finely divided that even microscopic methods of study yield no results.

Apparatus

The apparatus required for these X-ray patterns is a transformer capable of supplying 1 k.w. at approximately 30,000 v., a Cooldige X-ray tube, a set of slits to limit the beam of the X-rays, a sheet of suitable material to act as a filter for the X-rays, a small glass tube to hold the powdered substance and a photographic film bent in an arc with the glass tube as center. Fig. 1 shows a diagrammatic sketch of this apparatus.

The author, showing X-ray machine used for study of mineralogy. Photo copyrighted by Underwood and Underwood

The apparatus employed is the X-ray diffraction machine as marketed by the General Electric Co. The machine is so constructed as to make it possible to expose as many as 15 substances simultaneously, thus greatly reducing the cost of operation. The operation itself is one requiring very little skill, and the machine is designed to be as nearly safe as possible.

X-ray Tube, Filters and Slit System

It is necessary that the X-rays be of a monochromatic nature. To produce these it is necessary that the rays have a characteristic radiation of the desired wave-length; moreover, the radiation of this wave-length must at the same time be intense and capable of isolation by filtering. These factors depend upon the target employed and the voltage at which the tube is operated. The characteristic radiation increases with the voltage; however, if the voltage is too high, part of the general radiation becomes so short in frequency that it is impossible of separation from the characteristic radiation by filtering. The best operating voltage for a molybdenum target is approximately 30,000 v. and for a tungston target approximately 100,000 v.

It is impossible to produce perfectly monochromatic radiation by filtering, but for all practical purposes it can be accomplished. It is necessary to choose some material suitable to separate the characteristic radiation from other wave-lengths in the series and also from the general radiation. It therefore requires the selection of filter material, filter thickness and voltage to agree with the target employed. Zirconium is the proper filter for a molybdenum target tube. Zircon is powdered and then hardened in the form of a plate, using some organic substance as a binder. The thickness of the filter used in the General Electric machine is approximately 0.35 mm. With a tungsten target an ytterbium filter should be used.

The X-rays are passed through a series of slits. In

the apparatus in question, there are three slits. The first two define the beam, while the last eliminates the majority of the secondary rays produced by the edges of the second slit. There are numerous designs of slit systems being used at present. Most of them are attempts to introduce some special factor. They require, as a rule, a large quantity of the specimen or else the specimen must be in some special shape and they often lead to the accentuating of certain lines in the pattern. The one here described is, for general research, probably the best.

The Crystalline Powder and Its Exposure

As previously stated, Bragg's method required a large, more or less perfect, single crystal. With Hull's powder method the material may be in its ordinary condition. The material is powdered until it will pass through a 200-mesh screen. This figure is an arbitrary one as, for crystals whose habits are elongated, and hence tend to powder in thin needle-like forms, it is sometimes necessary to pulverize so they will pass the 325-mesh screen, while crystals whose habits are stumpy do not have to be ground finer than to pass the 100-mesh screen. Material that is not powdered fine enough gives a poorly defined pattern. Most substances can be powdered either by crushing, filing or chemical precipitation. The powdered material is mounted in a small glass tube of capillary size. The best results are obtained by using as large a tube as possible without exceeding the area of the beam of X-rays emitted by the split system. However, materials of high density and those which are more impervious to X-rays when mounted in comparatively large capillary tubes require very long exposures, hence it is more convenient to mount them in very thin tubes and in exceptional cases, as with the lead minerals, dilution with some amorphous material such as ordinary flour is an aid toward better results.

The mounting of the material in cylindrical form is necessary when a molybdenum target is used. Where a tungsten target is employed the powdered material should be pressed in flat sheets or placed between two plates of glass and set at right angles to the beam of X-rays.

Where a large number of lines are desired in the pattern long exposures are necessary. The average exposure in the photographing of minerals is about 12 hours. The greatest speed is obtained by placing the powder as near to the X-ray tube as possible and by using an intensifying screen. However, with rays as absorbable as those generated by a molybdenum tube the best results are obtained through using films, not plates, with the intensifying screen. Longer exposure increases the density of the patern, but does not increase the contrast and therefore nothing is gained. The film is held in position by a cassette, which is so

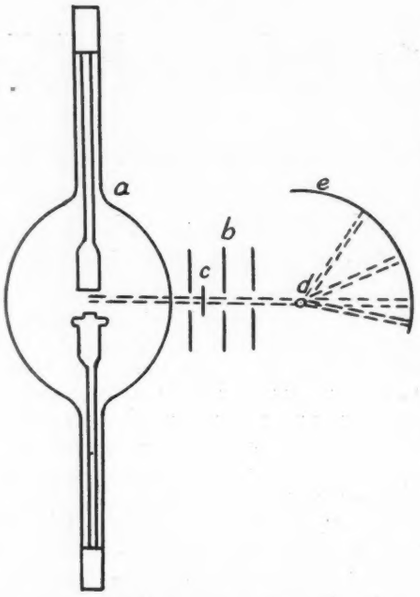


Fig. 1. Diagram of X-ray apparatus. a—Coolidge tube; b—Slits; c—Zirconium filter; d—powder in capillary tube; e—photograph film

constructed as to keep the film in an arc 8 in. in radius with the capillary tube as center.

The Photographs and Their Interpretation

The pattern produced on the film is a series of lines similar to a line spectrum. The X-rays on passing through the crystalline material are reflected on to the film

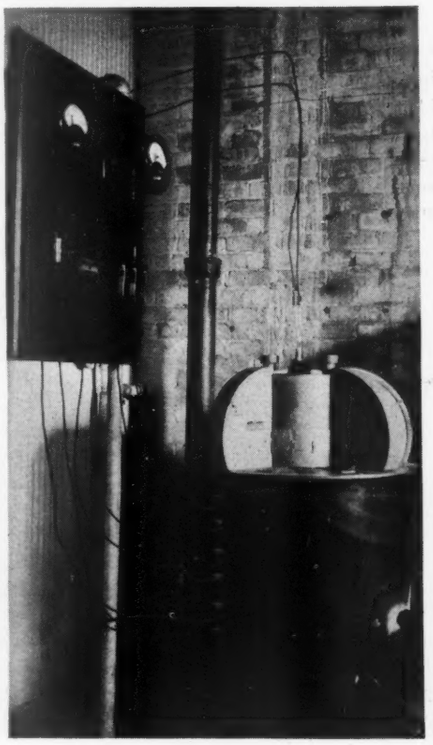


Fig. 2. X-ray diffraction apparatus assembled

by those planes which are in reflecting position. The main portion of the beam is not affected and passes on to strike the film at what is known as the zero line. The distance of the lines on the film from the zero line depends upon the distance between the planes of atoms in the crystal and for every important set of planes in the crystal there is a line on the film.

These X-ray patterns have been used principally to identify minerals and to determine crystal structure. Any true solid, formed under the control of natural forces, can be made to write its own "autograph," or X-ray pattern, no matter whether it is made in the great laboratory of nature or in some industrial or research laboratory. A diffraction pattern is as characteristic of a substance as is its density or solubility, and as such is a guide towards the identification of the substance. Substances of similar crystal structure will necessarily give similar patterns. However, as no two substances are identically alike, it follows that no two patterns are identical. In the case of halite (NaCl) and sylvite (KCl), substances which are similar chemically and crystallographically, the patterns are very closely related, the difference being chiefly not in the number of the lines, but in their distances apart, one being but the magnified pattern of the other. This is due in part to the difference in density of the two substances.

From these patterns the exact position and number of atoms can be determined; then, by multiplying the number of atoms in a unit volume by their atomic weights, the specific gravity of a substance can be found. This is probably the most accurate method for determining specific gravity known, as pore space, foreign matter, and other sources of error are eliminated. Another means by which substances may be distinguished is by the varying intensity of the lines. Materials which are similar in almost every respect and which give lines in almost the same position usually show patterns with marked difference in the intensity of certain lines.

In order to recognize a substance its pattern must be referred to a standard.* This necessitates comparing the pattern with a pattern of a known substance. The method employed is one of trial and error beginning with patterns of simple arrangement. Every line on the pattern must exactly coincide with those of the standard. Only in the case where all lines not coinciding with the pattern can be shown to correspond with some other pattern, thus proving the presence of

*At present the Department of Geology of the University of Wisconsin is engaged in establishing a collection of standard autographs. To date the collection is far from complete. In an attempt to get analyzed mineral samples to enlarge its collection of standard photographs as quickly as possible, the department will furnish an X-ray photograph of each sample submitted which is accompanied by a chemical analysis, free of charge. If unanalyzed samples are submitted there will be a minimum charge of $2. For a list of minerals of which the Department has standard patterns the reader is referred to A. N. Winchell's article, "'Finger Prints' of Minerals," *American Mineralogist*, Vol. 12, 1927, p. 262.

more than one substance, can there be any deviation from this rule. This method of analysis can be used quantitatively as well as qualitatively. This is accomplished through an estimate of the intensity of the lines, which in most cases is only approximate. The things to be emphasized are (*a*) every crystalline substance has a distinct pattern of its own, (*b*) a given substance will always yield a given pattern, (*c*) two substances in a mixture will yield their own individual patterns each independent of the other.

In problems, such as determining ductility, where work is done with crystals, anything leading to a more complete understanding of the crystal structure is of great value. The lines, as pointed out before, represent the reflections from the various atomic planes in the crystal. These reflections show up as a series of concentric circles where a photographic plate is used, as with a tungsten target, and as a series of lines where a film and capillary tube are used, as with the molydenum target. By measuring the diameters of the circles in the former and the distance of lines from the zero line in the latter the exact position of the atoms in the various planes can be determined. The crystals can be assigned to a definite system and, moreover, whether they are in open or closed packing can be ascertained. Through the use of a diffraction scale the distances between the lines can be interpreted as the spacings in Angstrom units‡ between the respective atomic planes. Distances as low as 0.55 Angstroms can be measured. Graphic charts of the isometric, tetragonal, and hexagonal systems have been prepared and by plotting the readings from the diffraction scale on a strip of paper and moving this along the logarithmic scale at the bottom of the charts the crystal structure may be determined. Aside from determining the crystal structure it is possible to ascertain the exact face each line represents. For a complete understanding of the mathematical theory of the pattern the reader is referred to A. W. Hall's work on the subject.†

There are four distinct advantages of this method of analysis; (*a*) a minimum amount of material is required, in some cases not over 50 mg. of material are needed; (*b*) the material is still available after exposure; (*c*) by lengthening the time of exposure very small amounts of material in a substance can be made to show, while by shortening it material can be analyzed without complication even though foreign substances are present in moderate amount; and (*d*) by narrowing the slits and using thin tubes of material it possible to obtain such clear definition of the pattern that a number of substances in a mixture can be determined with accuracy.

Examples

The following are some examples of work done by X-ray analysis. *B* in Fig (3) shows the diffraction pattern of a mixture of calcite ($CaCO_3$) and magnesite ($MgCO_3$) in equal proportions. If this were sent to a chemist to be analyzed it would be determined as $CaMg(CO_3)_2$ which, mineralogically, would be dolomite. *A* of this figure shows the diffraction pattern of magnesite, and *C*, that of calcite. By comparison, the pattern *B* proves to be a composite of the patterns *A* and *C*, in other words, what is present in *B* is not dolomite, but calcite and magnesite in a physical mixture. This is an important advantage of X-ray analysis as ambiguity is not seldom met with in chemical determination; especially is this true where compounds are in such a state of mixture as to be practically impossible of separation. Another important principle illustrated by this comparison is the possibility of quantitive analysis. In *B* the magnesite lines and the calcite lines appear equally intense from which one concludes that equal proportions of the two substances are present, which is true. From these patterns it would seem that the accuracy of analysis would vary greatly due to the high personal equation introduced. However, by the use of narrower slits and smaller amounts of crystalline material and careful control of exposure-time lines of very sharp definition can be obtained which give a high degree of accuracy.

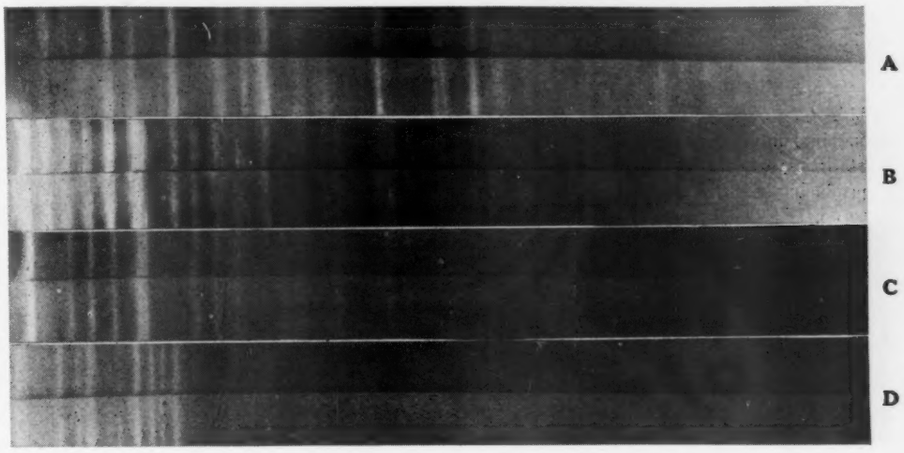


Fig. 3. A—Magnesite; B—Magnesite and calcite in a physical mixture; C—Calcite; D—Aragonite

D is the line pattern for aragonite. If *C* and *D* were analyzed chemically they would be determined as calcium carbonate; they cannot be differentiated by chemical analysis and they would be pronounced as one and the same substance. The diffraction pattern identifies each substance both chemically and physically.

Recently we had occasion to analyse some carborundum products for a large commercial company. They employed artificial bars of carborundum in their work. In a search for a more efficient bar they made one by soaking a carborundum bar with liquid silicon. The resulting product gave a bar of high durability under most adverse conditions, such as extreme heat, the bar even being of use after the melting point of the silicon had been reached. It was assumed that a new compound had been formed. A chemical analysis would tell merely what substances were present; it would not tell whether a new compound had been formed or whether the two materials were in a state of mixture. An X-ray pattern was made of pure carborundum, of pure silicon, and of the supposed new compound. By comparison it was found that all the lines of both the silicon and the carborundum patterns were present in the patterns of the new substance, proving definitely that the silicon and carborundum were in a state of physical mizture and not in a compound. It should be noticed that the two substances were so interfused and intercrystallized that the material appeared as homogeneous as a piece of steel. It is in work of this kind where knowledge of the internal atomic structure of a substance is necessary that the X-ray method is unrivaled in efficiency and practicability.

Again, in a study of shales containing concentrated organic matter submitted by A. J. Carlson, Department of Petroleum Engineering, University of California, Berkley, Cal., the X-ray proved of great assistance. J. E. Hawley, Department of Geology, University of Wisconsin, Madison, Wis., did considerable research work on these shales. The samples had been collected in Colorado, Utah, and Kentucky. The Colorado shale showed 3% inorganic material, the Utah 7% and the Kentucky 9%. It was thought the concentrates from these contained organic crystals as it seemed illogical that 3% of inorganic material would yield the diffraction patterns obtained in photographing them. By burning the concentrates the patterns were so intensified as to make them distinguishable as hematite in the Kentucky and Utah shales and as quartz in the Colorado shale.

As industry has advanced it has been necessary to go more and more minutely into the study of materials; especially is this true of industries dealing with products of cement. lime, gypsum and many others.

‡A minute unit of length equal to 1/10,000 micron or 1/100,000,000 cm., used in expressing wave lengths of light.

†A. W. Hull: The Positions of Atoms in Metals. *Trans. Amer. Inst. Elec. Eng.*, XXXVIII, II 1919, p. 1445.

Resumé of the World Trade in Portland Cement*

Tendency of Industry Evidently Toward National Self-Sufficiency—Development of Latin-American Portland Cement Production Is Reflected in Decreased Demand for the Product of United States Plants

By C. F. Stephenson

Minerals Division, Bureau of Foreign and Domestic Commerce, United States Department of Commerce

THE WORLD PRODUCTION of portland cement during 1927 was estimated at 396,541,730 bbl. (barrel = 376 lb.), as compared with an estimated production of 230,889,701 bbl. during 1913. Of this 165,652,000-bbl. increase, the United States accounted for 81,109,000 bbl., or nearly 49%. The potential productive capacity of all the portland cement mills throughout the world at the end of 1927 is estimated at 541,510,000 bbl. The quantity of portland cement entering into international trade, based on export statistics of the leading portland cement producing countries, during 1927 amounted to 35,176,548 bbl., as compared with 26,525,312 during 1913. With the exception of Switzerland and Russia, every country that was a producer in 1913 had a larger output during 1927 than during 1913, and German cement mills during 1927 produced quantities equaling their pre-war production for the first time since the war. Several countries, moreover, which were non-cement producers until the beginning of the present decade, now manufacture comparatively large quantities of this commodity.

Enormous Potential Capacity of World's Portland Cement Plants

The enormous potential capacity of the world's portland cement plants, estimated at 541,510,000 bbl., represents nearly 145,000,000 bbl. more than were actually produced during 1927. Of this 145,000,000-bbl. latency, United States mills alone account for nearly 54,000,000 bbl., or 37.1%, and German mills for 22,000,000 bbl., or 15.1%. The total production of portland cement plants in the United States for the year 1927 was 76.3% of their indicated capacity at the close of that year, according to the June cement summary of the United States Bureau of Mines. The ratio of world production of portland cement to world capacity for the same year is estimated at 73.2%.

Oversea Trade in Portland Cement

Oversea trade in portland cement has never been of great magnitude, principally because the raw materials necessary to its manufacture are so widely distributed throughout the universe as to permit the erection of cement mills in non-producing countries as soon as demands therein become heavy. This statement, of course, is rather broad and is to be taken accordingly, yet portland cement is now manufactured in 49 countries, or noncontiguous sections thereof, and it appears that capital is always available for the erection of new plants in any section of the world where sufficient demand is deemed to exist. Thus it might be said that the tendency throughout the world today is directed toward national self-sufficiency in portland cement.

A statement of this kind, however, demands certain modifications. Several countries which now produce portland cement in comparatively large quantities are still importing nearly as much as they did before plants were installed within their borders. The reasons are many. Among the most important are: (1) World demand for portland cement is steadily increasing; (2) foreign cement is still demanded in many of the home markets of the newly erected mills in Latin America and the Far East because of its reputed better quality; (3) lower production costs in certain European countries, combined with the ability of these same countries to ship their product to transoceanic markets at very low ocean freight rates, enable them to penetrate outlets thousands of miles away and to undersell the local product.

There are other factors, too, which deserve consideration in this connection. The Netherlands, for example, although possessing an abundance of raw material satisfactory for the manufacture of portland cement, has never produced more than negligible quantities, because the Belgian product and "dumped" German cement have been available in its markets at very low prices. It is said, however, that but little profit has accrued to the Belgians from their cement shipments into the Netherlands in recent years, and it is known that the German cement has been selling there at prices considerably under those within Germany itself. Some months ago, nevertheless, a year's agreement for a division of the Netherland market was made by the German and Belgian cement manufacturers. Shortly afterwards the price of portland cement in the Netherland market rose and, concomitantly, there was activity toward the completion of the new modern cement plant at Maastricht, in southeast Netherlands, started some years previous, but never completed by its founders because they feared their inability to compete with foreign cement. The capacity of this new plant is estimated at 1,759,000 bbl., or 40% of the Netherland present portland cement needs. It probably will begin actual production by the end of 1928. A price war hitherto had precluded the possibility of the profitable operation of any cement plants in the Netherlands.

South America More Independent and Cuba Practically Self-Sufficient

In this hemisphere, South America in general and Cuba are tending toward general self-sufficiency in portland cement. During 1913 Cuba, with no local cement industry, imported 795,600 bbl. Cuban cement consumption during 1927 approximated 1,600,000 bbl., practically all of which was produced locally. Brazil, with a domestic production of 15,000 bbl. in 1913, imported 2,728,000 bbl. during that year. In 1927 its domestic cement industry, working at full capacity, produced 400,000 bbl. and 2,598,000 bbl. were imported.

The United States during 1913 produced 92,097,000 bbl. of portland cement and imported 85,470 bbl. During 1927 the United States portland cement industry, with a capacity of 213,000,000 bbl. and shipments amounting to 171,865,000 bbl., imported 2,050,000 bbl. Thus, even though the American cement industry was well able to take care of domestic portland cement requirements, and notwithstanding the enormous expanse lying between the United States and Europe, European cement was able to penetrate American seaboard markets owing to price differential. The Cuban cement industry, on the other hand, with its plant located near the chief consuming centers and aided by governmental protection, was able to compete with foreign cement in practically every section of the island. (Cement im-

*Abstract of article in "Commerce Reports," July 30, 1928, and August 6, 1928.

ported into Cuba, originating in countries other than the United States, is dutiable at the rate of $0.50 per 100 gross kilos. Cement imported from the United States is dutiable at the rate of $0.40 per 100 gross kilos. There is also a surtax amounting to 3% of the duty.) Brazil's cement plant is located at Sao Paulo, a distance of about 320 miles from Rio de Janeiro. Its capacity recently has been increased to about 1,000,000 bbl. a year. It will be interesting to see whether the product of this plant, reputed to be of as good quality as any, can compete with foreign cement in the Rio de Janeiro market.

Competition of Low-Cost Producers Expected to Continue

Whether international trade in portland cement will continue to increase nothwithstanding the tendency toward national self-sufficiency remains a mooted question. It is certain that the consumption of portland cement throughout the world will continue to increase. It appears equally certain that countries like Belgium, with large modern cement plants in close proximity to excellent raw materials and fuel; with inland transportation costs to seaboard of only $0.28 to $0.42 per metric ton, according to distance of the haul; and with exceedingly low production costs, combined with the ability to ship the product to trans-oceanic markets at very low freight rates, enjoy advantages which will continue to permit them to compete not only in the markets of countries in close territorial propinquity, but also of those far removed from their shores—if no artificial means are taken to retard them.

It has been said that the quantity of cement imported into the United States as compared with the amount produced by the American mills is too small to affect the prosperity of the American cement industry. This statement might be true if it were possible to distribute the imported cement throughout the entire United States, but the fact is that the bulk of our imported cement is sold in important seaboard markets and vitally militates against the prosperity of the domestic mills which were erected to take care of these requirements. For example, during 1925 almost 10% of the cement consumed in Massachusetts was of foreign origin, during 1926 this item amounted to 20%, during 1927 to 17% and for the first four months of 1928 to over 36%.

Reasons for Decline in American Exports

Exports of portland cement from the United States have decreased from 4,000,000 bbl. during 1913 to fewer than 817,000 bbl. in 1927, although the ratio of production to indicated capacity of the American portland cement industry was but 76.3% last year. Sales of American cement abroad, outside of this hemisphere, always have been negligible—Canada, Cuba, Central and South America have always taken at least 95% of the foreign cement shipments. (Commodity shipments from the United States to Porto Rico, Hawaii and Alaska are not recorded by the United States customs as foreign; such trade is listed as "Commerce with non-contiguous territories of the United States.") One reason for the loss of the United States pre-war portland cement export trade is, of course, the inability to compete with low-priced European cement in foreign markets, notwithstanding the favorable impression American cement always has made therein because of its quality. European cement producers in many instances not only enjoy the natural and economic advantages mentioned heretofore—excellent raw materials, cheap inland water transportation and propinquity to seaboard and low-priced labor—but often procure ocean transportation at very low, and sometimes at ballast, rates, because of the availability of space in steamers westbound from Europe to this hemisphere. Shipments from Central and South America to Europe consist mainly of raw or bulky materials which occupy large space; conversely, exports from Europe to Central and South America consist mainly of manufactured goods which occupy generally but small space in proportion to value, thus permitting the carriage of commodities like cement at low rates, not only to fill the ship but in many cases to obviate the necessity of handling ballast.

Principal United States Outlet More Self-Sustaining

These factors, important as they are, do not represent the principal reasons contributing to the loss of the United States portland cement export trade. During 1913, for example, five countries—Panama, Canada, Cuba, Brazil and Mexico—together took 3,432,000 bbl., or 86%, of the American shipments abroad. Last year these same five countries took a total of 317,000 bbl., or 39%, of our 1927 cement exports. In 1913 construction of the Panama Canal was still active, which accounts for shipments there of 1,214,000 bbl., or 30%, of the total American foreign shipments. (All shipments from the United States to the Canal Zone carried in merchant vessels are considered as exports.) In 1913 Cuba purchased 697,000 bbl. of cement from the United States; during 1927 United States cement shipments to Cuba amounted to but 107,000 bbl. Cuba possessed no domestic cement industry in 1913, whereas its domestic production in 1927 amounted to over 1,500,000 bbl. Brazil's domestic production of cement in 1927 was 27 times as great as in 1913, and Mexico's cement industry now produces around a million barrels annually. Venezuela and Uruguay are the only South American countries which imported more cement from the United States in 1927 than in 1913. The increased American cement shipments to Venezuela in recent years have been used in connection with the expansion of its petroleum industry. At least 50 bbl. of high-quality cement is required for every well drilled, and during 1926 and 1927, respectively, there were 358 and 393 oil wells drilled in Venezuela.

American shipments of cement abroad, it is evident, have shown a steady decrease since the war, primarily because Latin America, the principal foreign market, is becoming more and more self-sustaining in its cement requirements, and, secondly, because the completion of the Panama Canal necessarily greatly lessened demand for cement in this region.

Although United States exports of portland cement are steadily decreasing, notwithstanding the concerted efforts on the part of certain American manufacturers in recent years to increase this trade, the enormous latent strength of our portland cement industry is so great that it will continue to influence somewhat international trade in this commodity.

The Belgian Cement Industry Favorably Located

Belgium, from both a natural and an economic standpoint, is pre-eminently fitted for the manufacture and exportation of portland cement. During 1913 it produced approximately 8,790,000 bbl. and exported about 5,200,000 bbl., or 59%, of its total production during that year. Belgian portland cement production in 1927 is estimated at 15,800,000 bbl., about 91% of its indicated capacity, or an average of 2 bbl. for every inhabitant of that country. This compares with a per capita cement production in the United States of 1.46 bbl.; Denmark, 1 bbl.; Norway, 0.8 bbl., and Germany, 0.7 bbl. during the same year. Belgium's exports of cement during 1927 amounted to 9,611,000 bbl., or 60% of its production for that year. During 1926 cement exports approximated 8,568,000 bbl.

Local Market Consumes About 40% of Present Belgian Production

No one can forecast the future geographic distribution of Belgium's cement exports, as the position of the Belgian producers in certain markets depends largely on the outcome of negotiations now in the making, and in which representatives from most of the European cement-producing countries have participated. It is possible that the conclusion of these negotiations will preclude the sale of Belgian cement in certain European markets. If such an outcome is reached, Belgian producers will be forced to develop new outlets, or to attempt to increase their sales in some of their present markets, such. possibly, as Latin America and the United States, as the local market consumes only about 40% of Belgium's present production. The new cement plant at present being erected (largely by Belgian capital) in the Netherlands, as mentioned before, will take care of about 40% of the Netherland present portland cement needs. A large part of this important market, therefore, will be supplied by the local plant after 1928.

German Portland Cement Industry

The production of portland cement in Germany during 1927 equaled that of 1913 for the first time since the war. The cement

syndicate association—composed of the North German, South German and West German cement cartels, and the Huettenzement-Verband, a group affiliated with the German steel interests and manufacturing portland cement from blast-furnace slag—largely controls this industry in Germany. Most of the portland cement companies in the country are members of one or other of these cartels. To the excellent organization of this central syndicate and the protection enjoyed under it may be attributed its propitious development in recent years.

Cartels Practically Control German Market

The principal activity of the German cement cartels is the regulation of prices, production and sales within Germany itself. This centralized control has deprived the individual member companies more or less of their respective autonomy and has forced nonlucrative plants to close, restricting manufacture to the better class and more modern factories. Working together for mutual interests, the cartels have been able practically to control the domestic market. High prices for cement in the domestic market have been maintained by the policy of keeping the supply for disposal at a minimum, although the effect has been to stimulate the erection of new plants, whose owners refuse to subscribe to the syndicate. To meet competition of these outsiders the cartel members in recent months have lowered cement prices in the markets of the non-cartel members.

Production in Germany Below Capacity

The estimated ratio of production to capacity of the German portland cement industry during 1927 was but 64%—existing plants were able to produce about 24,000,000 bbl. more of this commodity than were actually manufactured. Until late in 1925 the erection of new cement plants was prohibited by law; soon thereafter the cement syndicate limited production, thus increasing prices, and, as mentioned, dismantled the older and unprofitable plants, forcing a number of cement officials out of employment. To take advantage of higher prices these cement experts influenced capital to erect new plants, and today are the competitors of the syndicate in the home market.

Increase in Domestic Consumption Necessary

On the whole, the German cement industry is not very prosperous; wages have increased over 100% since 1913, whereas per-man production of cement has increased but 40%. Were it not for the tariff on cement, the product of adjoining countries which enjoy lower production costs would soon enter the German market. The conventional rate is $0.305 a barrel of 376 lb. and the standard rate $0.61 a bbl., but countries which have "most-favored-nation" treaties with Germany, of which the United States is one, pay the conventional rate. Even under present conditions some cement is imported from Austria and Switzerland.

Germany's domestic market for cement is by far the more important, although its export trade in this commodity now surpasses that of 1913. The Netherlands, followed, respectively, by Brazil, Argentina, Chile and Venezuela, are the principal foreign consumers. Profits on shipments to the Netherlands have been nil, however. In the domestic market the outlook for increased cement demands during 1928 is considered poor, as financial conditions in the building trades are not so good. The allowances for municipal construction are much lower than last year, and a smaller volume of industrial and agricultural building is expected. German cement manufacturers will do the utmost to maintain their present markets, both at home and abroad, and to bring production nearer to the capacity of their plants. The production costs, however, are comparatively high, and, in addition, the cement manufacturers are faced, in some countries, with countervailing duties on German-imported cement by reason of Germany's tariff on imports of this commodity. The domestic market will have to increase its consumption of cement if the industry is to be carried on at a figure approaching maximum capacity.

Danish Industry Confronted Many Handicaps

The production of portland cement in Denmark during 1913 amounted to 2,721,000 bbl., and, exclusive of the war period, when the output averaged about 2,000,000 bbl. annually, gradually increased to 4,000,000 bbl. during 1924. Since then production has decreased, and in 1927 amounted to 3,336,000 bbl.

The reasons for this diminished output are many. Conditions in the industry at the beginning of 1925 appeared quite propitious; cement plants were work to capacity and the possibility of exporting considerable quantities at fair profits looked very good. About the middle of the year, however, labor difficulties occurred, resulting in an almost complete cessation of activities for three months. Thus the most favorable time of the year for the sale of cement was lost to the industry. The sharp rise of the crown, the Danish monetary unit, which occurred during the strike, so increased the wages of returning workers that cement for export, previously ordered, was shipped at a loss. Later the British coal strike of 1926 made it exceedingly difficult for the Danish cement industry to procure coal, and, when coal was obtainable, very high prices were demanded. Activity was considerably curtailed during the latter months of 1926, and in 1927 three of the larger plants were forced to run on part time, because of lighter demands in the home market, although export trade for the year 1927 remained firm.

No Immediate Advance in Sales Anticipated

Denmark's export trade in cement is far more important than its domestic trade, shipments amounting to between 55 and 60% of production. In 1913 cement exports totaled 1,404,310 bbl., Finland and Russia together taking about half. In recent years, however, the principal foreign markets for the Danish product have been in South America, Porto Rico and the West Indies. During 1927 these three regions took about 72% of the total exports.

Denmark possesses raw materials of excellent quality for cement manufacture, although coal must be imported. The industry, consisting of eight plants (one of which has not been operated for some time), is highly organized. Six of the active plants are controlled by a board, which generally fixes sales policies and sales allocations and lends a guiding hand in the operation of these mills. Danish cement is of excellent quality and is well considered in foreign markets. The industry, however, is faced with comparatively high labor and production costs and is facing keener competition in foreign markets. Its officials have studied the possibility of increasing cement sales at home and abroad, but do not anticipate any considerable expansion in the near future.

French Cement Industry Widely Distributed

Raw materials used in the manufacture of the six classes of cement produced in France —artificial portland, grappiers, natural, slag, white and fondu—are widely distributed throughout the country, and plants producing one or more of these classes exist in over half of the 89 departments. The Department of Pas-de-Calais, in the extreme north, is by far the most important region in the manufacture of artificial portland cement, followed, respectively, by the Departments of Moselle, Seine and Oise, Bouches-du-Rhone and Isere. The departments leading in the production of natural cement are Isere and Bouches-du-Rhone, and in the cement produced from blast-furnace slag, Moselle, the metallurgical center, followed by Muerthe and Marne. The Department of Ardeche leads in the production of white cement and Cher, Dordogne and Ardeche, respectively, in the production of grappiers. Ardeche is also the principal production center of smelted cement (ciment fondu), a slow-setting but rapidly hardening product, which has high resistance to sulphurous earths, seepages and sea water, and has been adopted largely for port and harbor works and for use in mines. The Department of Savoie produces large quantities of electric-fondu cement. The Lafarge Co., one of the largest cement concerns in Europe, is the principal manufacturer of ciment fondu, and the Usine Electrometallurgique de Luzieres par Vabre, in the Department of Tarn, manufactures a smelted cement which is marketed under the trade name of Electro-ciment.

Production and Capacity Estimated

The following tabulation gives the present estimated capacity of the French mills and also the estimated production during the year 1927 of the classes of cement manufactured in France:

ESTIMATED CAPACITY AND PRODUCTION OF FRENCH PORTLAND CEMENT INDUSTRY

Item	Estimated capacity. Barrels	Estimated 1927 production. Barrels
Artificial portland	27,927,000	17,590,000
Grappiers	2,199,000	1,530,300
Natural	5,423,000	4,532,300
Slag	4,837,000	3,280,300
White	527,700	351,800
Fondu	510,000	375,250
Total	41,423,700	27,668,950

Expansion of French Export Trade Attempted

Before the war France exported approximately 2,000,000 bbl. of cement; foreign shipments during 1913 amounted to 2,355,000 bbl., of which Argentina, the leading foreign outlet, took 600,000 bbl. Algeria, Spain and Morocco were, respectively, its next best pre-war cement markets. During the war France was able to export only negligible quantities of this commodity, and during the early post-war years its factories were busily engaged in supplying cement for use in the great reconstruction campaign carried out in the devasted areas. New plants were erected and the capacity of older establishments was greatly increased to take care of these demands. As reconstruction neared conclusion the French industry sought to regain not only its pre-war export markets but also to penetrate new regions. Aided by the appreciation of the pound sterling as compared with the franc, the northern French cement manufacturers entered the English and Irish markets, and since 1924 these two countries have taken considerable French cement. As the northern factories use great quantities of British coal, this appreciation necessarily increased their fuel costs, which, however, were offset by the high prices received for shipments to the United Kingdom and Irish Free State. They also were able to ship their product to these two countries at very low rates, in empty colliers which otherwise would have returned to the United Kingdom without cargo.

The French tariff on cement is divided into three schedules, of which the United States receives the minimum. These schedules are as follows:

	Quick hardening —francs per 100 kilo gross	Slow hardening —francs per 100 kilo gross
Maximum	6	12
Special	2.44	4.88
Minimum	1.5	3.00

Difficulties Experienced in France During 1927

At no time during 1927 was the outlook cloudless for the French cement industry, and prices remained firm only because they were fixed by the national association of cement manufacturers. Two large cement plants in the Boulogne-sur-Mer district were kept open only by drastic measures and a solid reserve, which had been accumulated in the extraordinary years succeeding the great war. In the export trade the manufacturers were quite satisfied to have been able to hold their own in the sharp competition with the Belgians. In the Marseille district it was proposed, with little success, to solicit government subventions in the form of loans at low interest rates to stimulate construction projects.

If the French cement comptoir agreement, which expired July 31 of this year, is not renewed, it is believed that the effect will be detrimental to the French-Belgian-Luxemburg entente, and may increase competition abroad as well as price cutting. According to the agreement reached about a year ago by certain Belgian and French cement manufacturers, the French were to keep out of the Belgian and Luxemburg markets and the Belgian manufacturers were precluded from shipping more than 120,000 tons of cement annually to continental France or more than 30,000 tons to Luxemburg. A penalty of $4 a metric ton was to be applied if greater amounts were shipped.

Cement Industry in the United Kingdom Well Organized

The portland cement industry of the United Kingdom, which has a conservatively estimated capacity production of 31,000,000 bbl., appears to be in a very healthy condition. Demand for the British product was heavy during 1927 and shipments exceeded those of any previous year in the history of the industry. The actual cement production during 1924—the latest year for which official figures are available—amounted to 18,857,000 bbl. Since then the British plants have been improved considerably, if not reconstructed, with a much more extensive use of rotary kilns and an increase in capacity. Production during 1927 is conservatively estimated at 29,000,000 bbl.

From the standpoint of production and distribution, the British cement industry may be said to be efficiently organized. It appears that there are two large groups—the Associated Portland Cement Manufacturers (Ltd.) and its associated and controlled company, the British Portland Cement Manufacturers (Ltd.) and the British Cement Products and Finance Co. The foreign holdings of the Associated Portland Cement Manufacturers comprise 100% of the share capital in the Tolteca (Mexican) Co., 60% in their Indian concern, 50% of the British Columbia Cement Co. and 44% of their company operating in South Africa. The second and smaller group, the British Cement Products and Finance Co., controls the Ship Canal Portland Cement, Greaves, Bull and Lakin and the Holborough companies.

These two groups, which together furnish 65 to 70% of the cement produced in the United Kingdom, have their own selling and distributing agencies, which enable them to provide quick and cheap transport to customers in any part of the United Kingdom as well as in export markets. A few months ago the Associated Portland Cement Manufacturers (Ltd.) announced a dividend of 8% on the ordinary shares for 1927, or double the rate paid in the preceding year. The British Portland Cement Manufacturers paid a dividend of 15%, as against 12½% for the year previous. At the same time substantial amounts have been set aside by these companies for depreciation and sinking funds.

Gradual Increase in Cement Exports from the United Kingdom

Foreign-trade statistics of the United Kingdom since 1923 are not comparable with those for pre-war years, since 1923, data for the Irish Free State have been excluded. During 1927 British cement exports did not quite equal those of 1913, although included in the total exports during 1927 are shipments to the Irish Free State, Great Britain's largest foreign cement market in that year. Cement exports from the United Kingdom, however, have been gradually increasing since the war and now reach almost 4,500,000 bbl. The British East Indies receives large quantities of cement from the United Kingdom, as does British West Africa, but Argentina and Brazil, large pre-war importers of British cement, now purchase comparatively small amounts. Shipments to the Netherlands were heavy during 1923, 1924 and 1925, but during 1927 fewer than 7000 bbl. went to this market. On the whole, however, British cement exportation is growing, and new markets, especially in the Far East, are rapidly taking the places of those lost to other cement-exporting countries or to new local plants.

Gain in British Cement Imports

The increasing importation of cement into the United Kingdom is causing some alarm to the local industry, but no positive steps have yet been taken to retard its growth. Cement imports during the years 1925, 1926 and 1927 were, respectively 1,304,000 bbl., 1,983,00 bbl. and 2,502,000 bbl. Belgium is by far the principal source followed by France and Denmark.

The explanation of this relatively large import is the demand in the United Kingdom market for a low-priced cement. The British product is of the finest quality and as such commands large markets abroad in addition to the home outlet for the high-quality products. For certain types of work, however, a lower grade and cheaper cement can be satisfactorily used, and it is in this field that the continental product is able to compete.

Gypsum Industries Opens Office in New York

THE Gypsum Industries, the national association of gypsum products producers, which recently suspended activities in Chicago, is attempting to operate under a new lease of life with headquarters at 110 West 40th street, New York City. W. J. Fitzgerald, former traffic manager, is now the executive secretary. Most of the support for the new organization, at the present time, we understand, comes from Eastern manufacturers.

Portland Cement Production in July

Shipments Nearly 5% Above Those of July, 1927—Makes Up for Setback in June

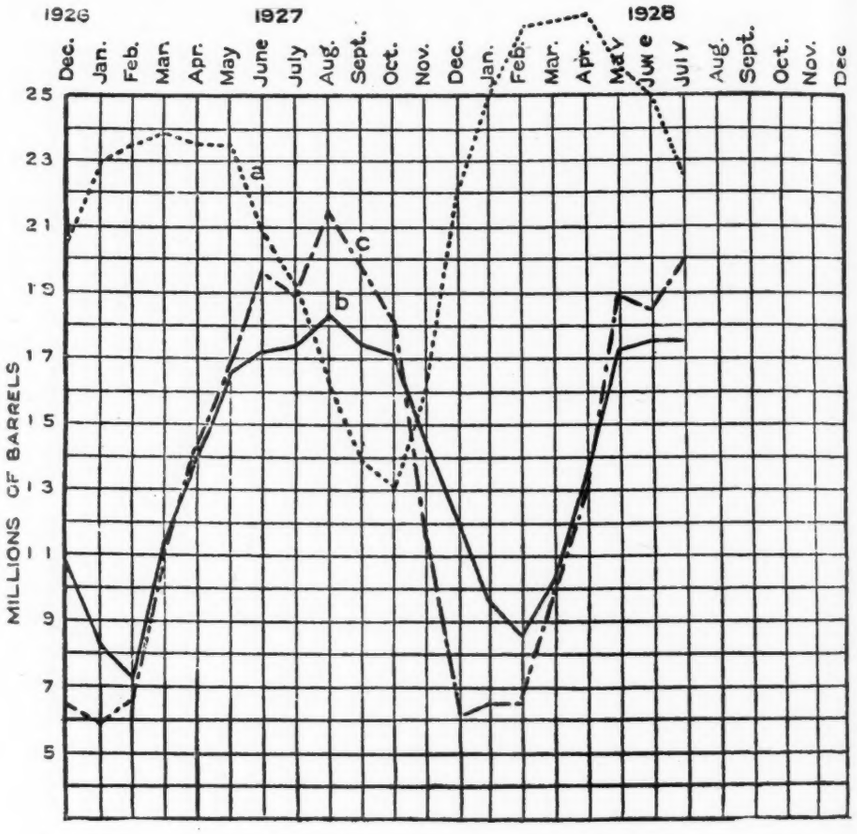
THE PORTLAND CEMENT INDUSTRY in July, 1928, produced 17,341,000 bbl., shipped 19,898,000 bbl. from the mills and had in stock at the end of the month 22,571,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in July, 1928, showed an increase of 0.1% and shipments an increase of 4.8%, as compared with July, 1927. Portland cement stocks at the mills were 16.4% higher than a year ago. The total production from January to July, 1928, inclusive, amounts to 94,436,000 bbl., compared with 92,466,000 bbl. in the same period of 1927, and the total shipments from January to July, 1928, inclusive, amount to 93,851,000 bbl., compared with 93,759,000 bbl. in the same period of 1927.

The statistics here presented are compiled from reports for July from all manufacturing plants except two, for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 158 plants at the close of July, 1928, and of 149 plants at the close of July, 1927:

RELATION OF PRODUCTION TO CAPACITY

	July Pct. 1928	July Pct. 1927	June Pct. 1928	May Pct. 1928	April Pct. 1928
Month	87.0	90.4	90.1	86.6	70.0
12 mo. ended	73.7	73.9	73.8	73.9	74.0



(a) Stocks of finished portland cement at factories; (b) Production of finished portland cement; (c) Shipments of nished portland cement from factoriesfi

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1927 AND 1928, IN BARRELS

Month	Production 1927	Production 1928	Stocks end of month 1927	Stocks end of month 1928
January	10,410,000	11,839,000	9,989,000	9,672,000
February	9,253,000	11,363,000	11,943,000	12,237,000
March	12,397,000	12,501,000	12,997,000	14,463,000
April	14,246,000	13,844,000	13,335,000	15,002,000
May	15,677,000	16,025,000	12,514,000	14,320,000
June	15,437,000	15,941,000	10,926,000	*12,944,000
July	15,697,000	15,967,000	9,609,000	11,681,000
August	16,396,000		7,887,000	
September	15,931,000		6,490,000	
October	16,469,000		5,960,000	
November	14,698,000		6,374,000	
December	13,177,000		7,660,000	

*Revised.

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN MAY AND JUNE, 1927 AND 1928, IN BARRELS*

Shipped to—	1927—May	1928	1927—June	1928
Alabama	164,359	294,946	155,252	218,443
Alaska	2,514	588	1,823	1,179
Arizona	46,724	23,982	45,172	45,357
Arkansas	77,207	120,605	77,555	94,530
California	1,281,461	1,101,338	1,153,990	1,135,923
Colorado	109,671	122,205	95,029	134,040
Connecticut	193,315	273,367	255,970	274,577
Delaware	35,564	35,361	32,807	31,076
District of Columbia	79,566	66,508	87,224	77,565
Florida	234,914	90,435	199,406	101,132
Georgia	209,126	167,422	196,027	151,318
Hawaii	25,631	29,807	31,227	19,441
Idaho	26,767	35,009	29,085	31,940
Illinois	1,402,964	2,087,924	1,921,502	1,921,820
Indiana	561,019	568,668	739,188	513,118
Iowa	357,184	929,356	553,469	790,414
Kansas	294,596	250,076	243,653	203,747
Kentucky	188,319	178,020	201,477	155,438
Louisiana	116,352	110,257	119,191	107,624
Maine	49,870	49,458	67,820	69,190
Maryland	224,398	250,926	245,061	240,228
Massachusetts	289,218	306,685	320,541	314,595
Michigan	1,258,924	1,218,783	1,504,877	1,393,059
Minnesota	387,814	446,443	485,312	490,086
Mississippi	74,061	89,421	76,227	90,654
Missouri	409,889	473,066	438,193	388,090
Montana	24,561	50,054	33,243	57,263
Nebraska	155,964	131,720	145,564	132,088
Nevada	7,495	11,050	12,853	10,583
New Hampshire	38,333	48,034	47,672	52,334
New Jersey	894,457	899,439	944,454	836,204
New Mexico	31,149	30,612	21,991	32,989
New York	2,188,026	2,414,892	2,869,955	2,369,486
North Carolina	367,215	259,658	325,413	253,034
North Dakota	40,034	69,986	74,012	89,107
Ohio	966,808	1,263,450	1,309,273	1,111,149
Oklahoma	309,509	307,249	266,615	271,078
Oregon	152,050	143,000	172,173	132,565
Pennsylvania	1,331,265	1,396,046	1,719,593	1,303,841
Porto Rico	2,250	500	1,750	
Rhode Island	77,876	93,304	68,486	81,651
South Carolina	87,442	141,083	64,616	174,819
South Dakota	38,442	65,137	54,405	81,989
Tennessee	217,416	274,229	219,588	231,638
Texas	545,848	601,278	419,994	563,118
Utah	32,759	38,520	40,344	50,931
Vermont	29,715	43,912	42,594	67,482
Virginia	168,463	201,315	204,817	198,998
Washington	223,574	315,209	295,426	342,740
West Virginia	141,521	151,015	170,166	126,545
Wisconsin	568,828	615,376	869,960	728,674
Wyoming	17,531	18,033	25,173	22,174
Unspecified	46,626	27,702	16,202	36,666
	16,806,584	18,932,459	19,713,410	18,353,730
Foreign countries	58,416	53,541	47,590	67,270
Total shipped from cement plants	16,865,000	18,986,000	19,761,000	18,421,000

*Includes estimated distribution of shipments from three plants each month.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JULY, 1927 AND 1928, AND STOCKS IN JUNE, 1928, IN BARRELS

District	Production 1927—July—1928		Shipments 1927—July—1928		Stocks at end of month 1927	1928	Stocks at end of June, 1928*
E'n Penn., N. J. and Md.	4,090,000	3,808,000	4,237,000	4,039,000	4,247,000	5,900,000	6,131,000
New York and Maine†	1,258,000	1,207,000	1,263,000	1,428,000	1,531,000	1,622,000	1,843,000
Ohio, W'n Penn. & W. Va.	1,909,000	1,834,000	2,056,000	2,172,000	2,806,000	3,096,000	3,434,000
Michigan	1,460,000	1,662,000	1,674,000	1,872,000	1,743,000	1,755,000	1,965,000
Wis., Ill., Ind. and Ky.	2,360,000	2,365,000	2,935,000	2,863,000	1,857,000	2,506,000	3,004,000
Va., Tenn., Ala., Ga., Fla. and La.	1,504,000	1,414,000	1,465,000	1,419,000	1,251,000	1,867,000	1,872,000
E'n Mo., Ia., Minn. & S. D.	1,509,000	1,736,000	1,931,000	2,323,000	2,419,000	2,544,000	3,131,000
W'n Mo., Neb., Kan. & Okla.	964,000	1,027,000	1,035,000	1,227,000	1,672,000	1,370,000	1,570,000
Texas	458,000	561,000	472,000	603,000	316,000	314,000	356,000
Colo., Mont. and Utah	239,000	260,000	254,000	291,000	531,000	455,000	486,000
California	1,264,000	1,124,000	1,241,000	1,192,000	624,000	752,000	820,000
Oregon and Washington	393,000	433,000	421,000	469,000	400,000	390,000	426,000
	17,408,000	17,431,000	18,984,000	19,898,000	19,397,000	22,571,000	25,038,000

*Revised.
†Maine began producing in April, 1928, and shipping May, 1928.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1927 AND 1928, IN BARRELS

Month	Production 1927	1928	Shipments 1927	1928	Stocks at end of month 1927	1928
January	8,258,000	9,768,000	5,968,000	6,541,000	22,914,000	25,116,000
February	7,377,000	8,797,000	6,731,000	6,563,000	23,563,000	27,349,000
March	11,450,000	10,223,000	11,100,000	10,135,000	23,922,000	27,445,000
April	14,048,000	13,468,000	14,350,000	13,307,000	23,654,000	27,627,000
May	16,701,000	17,280,000	16,865,000	18,986,000	23,503,000	25,972,000
June	17,224,000	17,469,000	19,761,000	18,421,000	20,972,000	*25,038,000
July	17,408,000	17,431,000	18,984,000	19,898,000	19,397,000	22,571,000
August	18,315,000	.....	21,411,000	.....	16,292,000	.....
September	17,505,000	.....	19,828,000	.....	13,996,000	.....
October	17,174,000	.....	18,105,000	.....	13,141,000	.....
November	14,449,000	.....	11,619,000	.....	16,022,000	.....
December	11,999,000	.....	6,200,000	.....	22,082,000	.....
	171,908,000	.....	170,922,000	.....	.....	.....

*Revised.

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN JULY, 1927 AND 1928, IN BARRELS

District	1927—Production—1928		Stocks at end of month 1927	1928
Eastern Pennsylvania, New Jersey and Maryland	3,783,000	3,648,000	1,172,000	1,840,000
New York and Maine*	1,165,000	1,159,000	426,000	963,000
Ohio, Western Pennsylvania and West Virginia	1,576,000	1,537,000	1,108,000	1,663,000
Michigan	1,348,000	1,310,000	1,280,000	1,356,000
Wisconsin, Illinois, Indiana and Kentucky	2,026,000	1,984,000	1,085,000	1,139,000
Virginia, Tenn., Ala., Georgia, Florida, Louisiana	1,389,000	1,385,000	773,000	964,000
Eastern Missouri, Iowa, Minn. and South Dakota	1,350,000	1,628,000	592,000	812,000
Western Missouri, Neb., Kansas and Oklahoma	858,000	1,039,000	457,000	580,000
Texas	483,000	561,000	208,000	102,000
Colorado, Montana and Utah	140,000	229,000	540,000	371,000
California	1,284,000	1,096,000	1,434,000	1,350,000
Oregon and Washington	295,000	391,000	534,000	541,000
	15,697,000	15,967,000	9,609,000	11,681,000

*Maine began producing April, 1928, and shipping May, 1928.

Exports and Imports

Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN JUNE, 1928

Exported to—	Barrels	Value
Canada	3,566	$ 19,747
Central America	5,318	14,915
Cuba	13,364	26,406
Other West Indies	4,023	10,370
Mexico	5,763	20,528
South America	20,389	69,104
Other countries	7,113	40,243
	59,536	$201,313

IMPORTS OF HYDRAULIC CEMENT, BY COUNTRIES AND BY DISTRICTS, IN JUNE, 1928

Imported from	District into which imported	Barrels	Value
Belgium	Galveston	12,600	$ 17,211
	Massachusetts	53,295	72,834
	New Orleans	3,500	4,790
	New York	8,100	10,227
	North Carolina	59,046	71,738
	Ohio	1	4
	Oregon	13,998	17,312
	Philadelphia	29,388	42,834
	Rhode Island	14,458	19,128
	Sabine	1,500	2,062
	South Carolina	30,000	37,187
	Washington	12,000	17,144
	Total	237,886	$312,471
Canada	Maine & N. H.	7,959	$ 17,754
Denmark	Porto Rico	14,000	$ 18,940
France	New York	740	$ 1,509
Italy	New York	2	$ 4
United K'd'm	New York	2,450	$ 4,310
	Philadelphia	3,500	$ 4,649
	Total	5,950	$ 8,959
	Grand total	266,537	$359,637

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII, AND PORTO RICO, IN JUNE, 1928

	Barrels	Value
Alaska	1,251	$ 3,601
Hawaii	31,741	68,208
Porto Rico	4,161	10,363
	37,153	$82,172

Tampa Cement Mill to Close for Three Months

TEMPORARY DECREASES in the demand for cement throughout the entire state and the possibility of the Florida railroad commission authorizing readjustment of freight rates south of Jacksonville caused officials of the Florida Portland Cement Co. to announce recently that the plant on Hooker's point would shut down August 1 for approximately three months.

Closing of the factory will throw 125 skilled workmen out of employment and means a loss of $15,000 a month in payroll money to Tampa merchants.

Announcement of the closing of the plant was followed by formulation of plans by the newly-organized Tampa Traffic Association to send J. F. Keeley, general manager, to Tallahassee, August 7, to fight the proposed rate increase, which would place the local company on an unfair competitive basis with manufacturers outside Florida.

The slow but steady falling off in the demand for cement throughout Florida, according to S. W. Storey, of Chicago, vice-president of the company has reached so low a level that further operation of the plant was considered inexpedient, although Mr. Storey and other officials of the firm, including F. M. Traynor, director of sales; J. E. Curtis, general manager, and O. A. Hartley, superintendent, are confident that business will pick up before early fall.

"Our quarries near Brooksville were closed a week ago," Mr. Storey said. "Approximately 125,000 bbl. of finished cement is stored in our warehouses today and an additional 133,000 bbl. of clinker, which requires grinding and mixing with gypsum, would enable us to increase our reserve to 258,000 bbl. in a few days. This stock, valued at $500,000, coupled with the falling off in orders justifies us in ordering a temporary shutdown. As much as we hate to lay off our employes, most of whom are skilled workmen and receive good wages, good business requires us to close the plant until such time as the demand for the product exceeds the production capacity of the works."

Because of uncertainty in the trend of business, Mr. Storey declined to make a positive prediction as to the date of the reopening of the factory. It may be two months, he said, and certainly will not be longer than three months.

Florida, according to Mr. Storey, has a normal cement consumption of 2,500,000 bbl. and the Hooker's point plant can manufacture 1,500,000 bbl. per year. This leaves a margin of 1,000,000 bbl. open to outside manufacturers, providing state pride impels builders to patronize home industries.

The state demand, however, has dropped far below the estimated annual total. This has been due, Mr. Storey said, to retarded construction. Building operations all over the state have failed to keep pace with the activity of 1925 or 1926 and are falling behind the 1927 figures.—*Tampa* (Fla.) *Tribune.*

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1927 AND 1928

Month	1927 Exports Barrels	Value	1928 Exports Barrels	Value	1927 Imports Barrels	Value	1928 Imports Barrels	Value
January	75,346	$ 254,072	56,400	$204,875	193,175	$ 269,661	234,753	$342,797
February	71,404	233,985	62,828	221,620	130,421	200,680	164,408	217,525
March	67,956	240,165	74,983	265,719	181,145	261,519	235,930	330,074
April	72,383	243,832	61,676	205,882	192,318	313,262	249,458	324,371
May	59,332	205,574	70,173	236,005	178,929	263,618	190,509	256,872
June	69,205	237,281	59,536	201,313	129,111	201,682	266,537	359,637
July	72,337	249,737	.....	.....	175,042	249,665	.....	.....
August	61,371	209,198	.....	.....	117,605	170,167	.....	.....
September	57,890	207,817	.....	.....	233,066	304,796	.....	.....
October	67,639	230,668	.....	.....	221,274	321,777	.....	.....
November	79,764	257,428	.....	.....	141,485	190,419	.....	.....
December	62,099	226,960	.....	.....	156,609	209,205	.....	.....
	816,726	$2,796,717	.....	.....	2,050,180	$2,956,451	.....	.....

Hints and Helps for Superintendents

Auxiliary Plant for Winter Storage

AT A PLANT IN TOPEKA, KANSAS, it was desired to accumulate sand for delivery in winter. The current product, which was dredged from the river, froze in the cars, which made it hard to unload. What was needed was a method of accumulating a sufficient tonnage of sand that would dry out in the warmer months of the year, combined with an easy method of recovering it from storage and loading it on cars.

The problem was solved by building a small auxiliary plant and installing a cableway scraper bucket to move the sand in and out of storage. The dredge pumped to this little plant when it was not occupied with regular production and worked after hours if necessary. As the sand accumulated near the plant it was pulled out of the way by the scraper bucket, and this not only put it in storage but helped to drain and dry it. When cold weather came there was a stockpile that might contain 40,000 or 50,000 tons ready for winter delivery. But the amount that can be carried in storage at such a plant may be almost anything in reason, as the sand can be pulled a long distance from the point of discharge by the cableway.

The little plant is about as simple as a plant can be. It consists of a settling bin of triangular section set on four posts. Above this is a screen, on about a 45 deg. angle, which receives the pump discharge. This screen takes out trash and a little oversize, and these go into a chute that connects with the flume which receives the overflow of the settling bin.

The cableway scraper bucket is a "homemade" affair which will hold perhaps 1½ yd. when full. An A-frame is used instead of the usual post. At the bottom of the A-frame an angle sheave is suspended for the drag rope to pass through, and a sheave at the top of the A-frame carries the return line. The hoist (not shown in the pictures) is in a small house near the main plant.

The scraper bucket discharges on the grate, which can be seen in the lower right-hand corner of one picture. This grate is over a hopper, the bottom of which feeds to a short inclined conveyor belt, discharging to a movable chute to the car that is to be loaded.

This simple arrangement works very well and requires little labor. One man has to look out for the screen and the valves of the settling bin while the dredge is running, but this same man may operate the scraper bucket when the dredge is not pumping to the little plant. As it is desired to drain and dry the sand as much as possible, it is better to allow the sand to accumulate rather than to draw it away as fast as it is discharged from the settling tank. The discharging of the scraper bucket and conveying to the cars can be looked after by the man who moves the cars and trims them.

Of course the scraper bucket can be set to drag either way so as to pull the sand to the other side of the plant from the carloading conveyor in order to build a stockpile.

With a little elaborating and more permanent construction this method could be well applied to a plant for current production. The settling bin in such a case would be designed to make two products and these might be accumulated in stockpiles on both sides of the plant. The scraper bucket would work with less power and give more satisfactory service if it were one of the standard types. The use of the A-frame instead of a post is a good one, especially in building and recovering from a long storage pile where the pull is in a nearly straight line.

This auxiliary storage arrangement is at Plant No. 3 of the Consumers Sand Co., Topeka, Kansas.

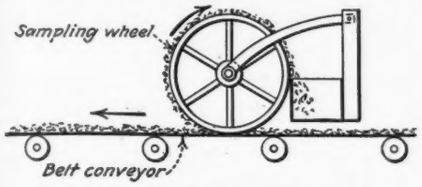
The auxiliary plant, showing the settling bin at the left, and the A-frame for the scraper at the right

The scraper bucket discharging to the grate at the right, with the A-frame shown behind

The settling bin with the screen above set at a 45-deg. angle and the chute to waste flume

Sampling Portland Cement Filter Cake

NOW that vacuum filters are being used in the portland cement industry, the following idea from *Engineering and Mining Journal* should prove interesting to a few cement plant superintendents, at least. Possibly the same idea could be applied to sampling dry materials, if the roller pick-up were moistened for sampling raw material,



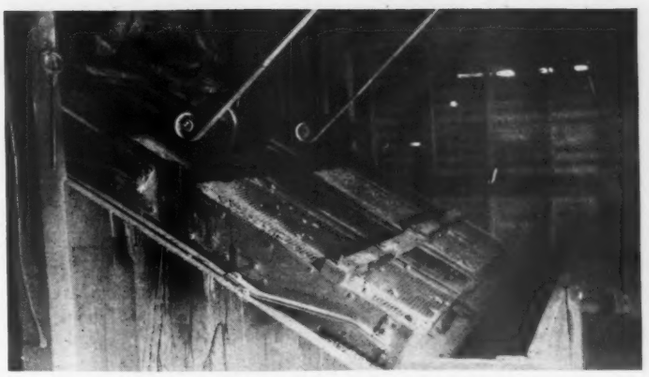
A wheel for sampling cement filter cake from the conveyor belt

or provided with cups or corrugations for clinker or finished cement. The device is described as follows:

"A novel and effective method of sampling the residue from a battery of American disk filters is in operation at the mill of the McIntyre Porcupine Mines, Ltd., at Timmins, Ont. Noting how material built up on the mud guard of his automobile, the superintendent reasoned that a wheel would make a good sampler for residue being conveyed on a belt. The accompanying illustration depicts how the idea was put into effect. A small wire scraper, to remove excess of slime before the deflector and sample box are reached is not shown in the sketch."

Home-Made Vibrating Screen

A SIMPLE and easily-made vibrating screen may be made similar to the one shown in the illustration without difficulty. The framework is made of 2-in. lumber, and bolted together as shown. It is mounted at the four corners on specially bent pieces of spring steel which are shown clearly in the illustration. The vibration is obtained from revolving a heavy clinder which is turned on an axis not at the center. The bearings for this eccentric are mounted on the top of the screen and the eccentric is driven by a belt from a line shaft or motor. Two screens of this type are at work at the crushed stone plant of the North Shore Material Co., Racine, Wis., and are reported to be doing satisfactory service.



Battery of home-made vibrating screens

An Unusual Car Puller

AT the plant of the Peters Sand and Gravel Co. at Burlington, Wis., there is in use an unusual car puller, which is said to give excellent service. An old Reliance truck, which had given out after years of service, was found to contain a good engine still, and so the front part of the machine was mounted on wooden skids and set up on a concrete foundation beside the track for use as a car puller. The parts retained were the engine, radiator, dash, seat and gasoline tank. The transmission rod was left intact and run through a bearing on the wooden skid frame. A gear was then bolted to the transmission rod and this drove the cable drum by chains through two pairs of reducing gears. The latter were necessary to bring the speed of the truck engine down to the slow speed necessary for pulling cars. No clutch is necessary, as the clutch of the truck engine is used. The drum is hooked up to do the pulling while the truck engine is in reverse, and then there are three speeds ahead for letting out the slack.

An unusual car puller made from an old truck

Numbering Pneumatic Air Drills

W. L. HOME
Mining Engineer, Pine Plains, N. Y.

THE serial numbers as stamped on air drills by the manufacturers are always so long and complicated that they are not of much service to a company requiring records kept of the performance of each machine. Also these numbers are small, hard to read and frequently illegible because of their location on the drill.

Although there are a great many systems in use for numbering machines the following one appears to be exceptionally good and so far as I know is original. A piece of brass tubing, about 1 in. long, the inside diameter of which is about the same as the outside diameter of the side rod on the drills, has the company number stamped on it in large plain figures. When the machine is put in service the serial number is kept for reference and the company number referred to thereafter. The side rod on the right hand side of the drill is taken out and the brass ring, with the proper company number, slipped on over it. After the side rod is put in place the number cannot be lost off and is always easily found and read. The only mistake that can be made is when the machine is taken apart for repairs. However since this should always be done in the shop this should not happen.

Packing Mica Washers for Shipment

(H. N. Kirk & Co., Keene, N. H.)

IN packing mica washers for shipment the following methods have been used with success. The washers are first placed on rods and shaken to remove all weak washers. Then the rods are placed on end in the packing box and filled to the top of the box, the rods being just as long as the box is high. For washers 2 in. and more in diameter, boxes 18 x 14½ in. are used and the depth of the box is varied to suit the number of pounds to be shipped. When the box is filled, wooden cleats are placed over the washers between the ends of the rods to compress the washers and keep them flat and in shape. By this method poor washers are rejected, and shipments arrive in good shape.

Charles W. S. Cobb

FOLLOWING a lingering illness, which has confined him to his bed for many months, Col. C. W. S. Cobb, for many years one of the outstanding American lime manufacturers, died at his home in St. Louis, Mo., August 8. His was a strong, rugged personality, which left its impress on the minds of all who met him, and one which those who knew him more intimately quickly learned to love and respect. He was long a power in the National Lime Association—for many years its treasurer.

Charles W. S. Cobb was born October 6, 1849, at Rockland, Maine, where his father had long been a lime and cement manufacturer. He has told the editor that his father established the first portland cement plant in America at Rockland—the old-fashioned vertical kilns. In 1880 he married an Augusta, Maine. lady—Miss Sarah Haskell—and set out for St. Louis, Mo., to make his fortune. In partnership with Charles W. Goetz he established the firm of Goetz and Cobb, dealers in masons' supples, lime, cement, plaster, etc.

This firm handled the output of the lime kilns at Glencoe, Mo., 30 miles west of St. Louis on the Missouri Pacific railroad, which had been purchased in 1876 by Messrs. Francis Cobb, H. W. Wight and John S. Case under the name of Glencoe Lime Co. This property comprised some 1000 acres of land on which was an inexhaustible supply of high grade limestone.

In 1889 the partnership of Goetz and Cobb was dissolved by mutual consent and a new corporation organized by Mr. Cobb under the name of Glencoe Lime and Cement Co., with a capital of $50,000. C. W. S. Cobb was president; T. W. C. Bohn, secretary; E. S. Healey, vice-president and treasurer.

The new corporation continued the handling of the lime kilns and properties of the Glencoe Lime Co. and gradually enlarged its business in masons' supplies and kindred lines until 1909, when its capital was increased to $1,050,000 and the lime plants of several competing concerns purchased outright, including interests of the Glencoe Lime Co.

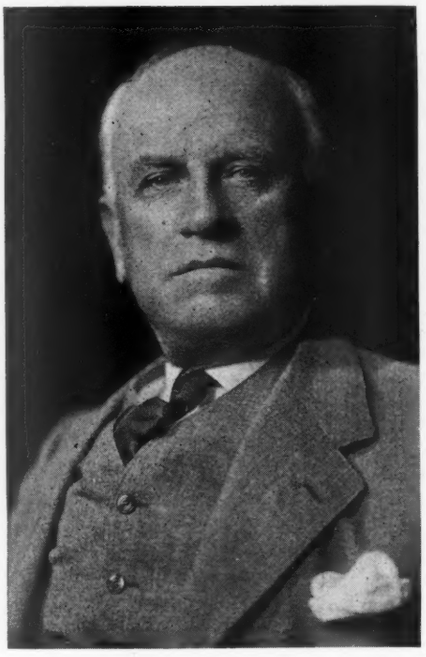
Mr. Cobb continued as president of the new Glencoe Lime and Cement Co. until September, 1926, when he voluntarily relinquished the position on account of failing health. The board of directors, on receipt of his resignation, immediately created the new office of chairman of the board and elected him to fill that position by a unanimous vote.

On January 20, 1928, Mr. Cobb suffered a stroke of paralysis, and since that date has been confined to his bed unable to do anything.

Mr. Cobb had been well and favorably known in commercial circles of St. Louis for many years. As a member of the Chamber of Commerce, he was appointed some years since to the Municipal Bridge Commission, which organization was largely instrumental in securing a readjustment of rates from the Terminal Railroad Association that was of lasting benefit to the whole community. He was for several years receiver of the Mercantile Club, the largest club in the city. During the World War, Mr. Cobb was director of the Eighth District for the National War Service Committee on Lime.

Both Mr. and Mrs. Cobb were very active in church and charitable work through their lifelong membership with the Pilgrim Congregational church.

Surviving are his daughters, Miss Ruth D. and Miss Helen Cobb, with whom he resided at 5412 Cabanne avenue, St. Louis, and a brother, William T. Cobb, of Bath, Maine, former governor of Maine. Funeral services were held August 10 from the Pilgrim Congregational church. Burial was at Rockland, Maine, August 12.



Charles W. S. Cobb

Henry D. Brewster

HENRY DEMAREST BREWSTER, first vice-president and trustee of the Excelsior Savings Bank, New York City, died August 7 at Dr. Slocum's sanitarium at Beacon, N. Y., following an illness of several months. He was in his 75th year.

In addition to his banking activities, Mr. Brewster was a director of the Lawrence Portland Cement Co. of 302 Broadway and was connected with a number of other business concerns. He was at one time vice-president of the old firm of Brokaw Bros., from which he retired 15 years ago. He was a trustee of the Clinton Hall Association, a director of the Mercantile library and was a member of the board of directors of Midtown hospital.

He was president of the board of trustees of the Rutgers Presbyterian church at Broadway and 73rd street. He was a member of the Union League Club and of the Apawamis Golf Club at Rye.

Gulf Gypsum Company Developing Texas Property

POSSIBILITY of an entirely new industry for South Texas, from which the lower Rio Grande valley will profit, is being developed by the Gulf Gypsum Co., a few miles south of Falfurrias, Texas.

There an illimitable supply of gypsum has been discovered and the company has leased an 870-acre tract from Ed. Lasater from which they are shipping five cars daily to San Antonio and Alabama.

"It is possible for us to get 30 cars a day for the next 70 years from this deposit," J. R. Forsythe of Falfurrias, manager of the plant there, said. "We employ on an average 16 men standing force and have our own manufacturing plant and machinery on the ground. We have our own spur track leading from the pit to Gipmine on the Southern Pacific, where our products are taken on into San Antonio and Alabama."

The cost of mining the gypsum is approximately 60c a cu. yd. The product is fairly expensive and one carload is considered at 100,000 lb., he said.

The firm is planning to install wallboard machinery at the pit near Falfurrias as well as machinery to make building blocks. This will be done within the next month or two.

Gypsum is mined similarly to marble and other rocks. A hole 40 ft. in depth is drilled in the pit and a charge of dynamite is set off in that hole. The gypsum is broken off in blocks which are carried by conveyors to the crushers, where it is then broken into pieces small enough to go through a 1¼-in. mesh screen. From the screen the material is carried by conveyors to box cars.

There are other gypsum deposits in North Texas and in New Mexico and Arizona, but members of the Gulf Gypsum Co. say that have never seen a better quality of gypsum or such an abundance of the mineral. "We have been working here several months and have shipped away thousands of tons of the mineral, but we have not so much as even scratched the surface, figuratively speaking," Mr. Forsythe said.—*Raymondville* (Tex.) *News.*

The Gulf Gypsum Co. has been reported at various times as interested in establishing products plants at Florida coast cities.

Editorial Comment

Filters for Cement Slurry

Eleswhere in this issue is a description of the first portland cement mill to be designed to include slurry filtration in the original design — the first in the world so far as we know. The introduction of filters for dewatering slurry is the first radical change in the process of cement manufacture in several years. It is no small satisfaction to us to note that the use of filters for this purpose was suggested in an article in Rock Products, April 12, 1919—not the first suggestion probably, by any means, but nevertheless an early and an original suggestion.

Markets To Be Developed

The rock products industries are almost unique among American industries in that prospects for future expansion are hardly less than has been the actual expansion in the past two decades. We can conceive of an ultimate limit to the consumption of automobiles, electric refrigerators, or what not; but who can foresee the ultimate limit for such materials as are embraced under the general term "rock products"? No one would say that we have anywhere near reached the limit in paved highways, in vast public improvements such as sewers, water-works, water-power development, flood-prevention works, internal waterways, etc. We are steadily outgrowing present facilities in all of these lines, to say nothing of new projects.

Herbert Hoover, in his address accepting the nomination of the Republican party for President of the United States said: ". . . the time has arrived when we must undertake a larger visioned development of our water resources. Every drop which runs to the sea without yielding its full economic service is a waste . . . The congress has authorized and has in process of legislation great programs of public works. In addition to works in development of water resources, we have in progress large undertakings in public roads and the construction of public buildings. All these projects will probably require an expenditure of upwards of one billion dollars within the next four years."

We can imagine that greater development of water power is not looked upon with pleasant anticipations by the coal industry, because such power will replace just so much coal. But to producers of rock products—cement and aggregates—it means a demand for enormous production.

One cannot turn in any direction without meeting with a similar optimistic outlook for the future of these rock products industries. For example take agriculture: William Harper Dean, manager of the agricultural service of the Chamber of Commerce of the United States is responsible for these figures: "The farm population has decreased by 3,000,000 in the past eight years. The farm plant has been reduced by 13,000,000 acres, but its crop production has increased 5% and that of animal products 15%."

"There is no question," Mr. Dean said, "but that the level of farm prices will continue to rise. Population is increasing over the entire world and there is an absolute limit to the amount of land from which the world's population will be fed and clothed. But it will require a progressively decreasing number of operators to produce this food and clothing as improved methods displace hand labor. American agriculture is becoming in all its branches a highly specialized industry."

What does this mean to the rock products industry? That the farmer who survives as a farmer is becoming more intelligent and a better business man. And the intelligent farmer and good business man invariably uses agricultural lime or limestone, rock phosphate or other mineral fertilizer. He builds substantial buildings and accessories of concrete. He buys equipment of steel which requires the use of rock products such as limestone to manufacture.

Fires on farms in the United States annually take a toll of 3,500 lives and cause a property loss of $150,000,000, according to a statement by engineers in the Division of Chemical and Technological Research of the Department of Agriculture, David J. Price and Harry E. Roethe. They state that the annual increase in loss of property from farm fires is three times as great proportionately as that from city fires. This means the farmer of the future will be one of the best customers for concrete block, gypsum and other fireproof materials made of rock products.

There is no gainsaying the fact that at the present moment production facilities in all rock lines in most localities have overtaken the possibilities of immediate demands; but of the future there can be no cause for worry. We are engaged in industries where we can look forward for many years to constantly greater demands. We confidently believe we are entering an era of public works development unprecedented in all history. The war taught us we could raise and spend near 30 billion dollars without any great hardship—money that was practically wasted, economically. Should it be difficult to persuade our citizens that we can afford to *invest* an equal amount in public improvements which are lasting and profit-producing?

Mr. Hoover said: "Our problems of the past seven years have been problems of reconstruction; our problems of the future will be problems of construction. They are the problems of progress."

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. com.[37]	12-30-27	3	7	
Allentown P. C. 1st 6's[37]	12- 5-27	90	92	
Alpha P. C. new com.	8-13-28	44	46	75c qu. July 14
Alpha P. C. pfd.[2]	8-13-28	116	.....	
Amer. Aggregate 6's, bonds	8-15-28	102½	103	
Am. L. & S. 1st 7's[32]	2-24-28	101¾	102½	
American Silica Corp. 6½'s	8-15-28	97	99	
Arundel Corp. new com.	8-14-28	37¾	38	50c qu. July 2
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	7-18-28	103	109	
Atlas P. C. com.[2]	8-13-28	39	42	50c qu. June 1
Atlas P. C. pfd.	8-13-28	47	49	66⅔c qu. July 2
Beaver P. C. 1st 7's[30]	8- 9-28	98	100	
Bessemer L. & C. Class A[4]	8-10-28	33¼	34¼	75c qu. Aug. 1
Bessemer L. & C. 1st 6½'s[4]	8-10-28	100	100½	
Boston S. & G. com.[16]	8-10-28	78	82	$1 qu. July 2
Boston S. & G. 7% pfd.[16]	8-10-28	83	85	1¾% qu. July 2
Boston S. & G. 1st pfd.[16]	8-10-28	92	95	2% qu. July 2
Canada Cem. com.[42]	8-10-28	27½	28	
Canada Cement pfd.[43]	8-10-28	99	.....	$1.62½ qu. June 30
Canada Cement 5½'s[43]	8-10-28	101	101¾	
Canada Cr. St. Corp. 1st 6's[43]	7-27-28	97	98	
Canada Gyp. & Alabastine	8-13-28	60	62	
Certainteed Prod. com.	8-13-28	42⅞	43⅞	$1 qu. July 1
Certainteed Prod. pfd.	8-13-28	94½	95	
Cleveland Stone new st'k	8-14-28	.....	62	50c qu. Sept. 1 & 25c ex.
Consol. Cement 1st 6½'s, A[42]	8-15-28	94	98	
Consol. Cement 6½ notes[24]	8-15-28	93	97	
Consol. Cement pfd.[41]	8-15-28	40	60	
Consol. S. & G. com. (Canada)	8-13-28	12½	12½	
Consumers Rock & Gravel, 1st Mtg. 6's, 1948	8- 9-28	98	99½	
Coosa P. C. 1st 6's[32]	12-28-27	65	75	
Coplay Cem. Mfg. 1st 6's[40]	8-11-28	90	.....	
Coplay Cem. Mfg. com.[40]	8-11-28	12½	.....	
Coplay Cem. Mfg. pfd.[40]	8-11-28	72½	.....	
Dewey P. C. 1st 6's[30]	8-15-28	99	101	
Dolese & Shepard[7]	8-15-28	145	148	$2 qu. Oct. 1 $1 ex. Oct. 1
Edison P. C. com.[19]	7-14-28	no market		
Edison P. C. pfd.[19]	7-14-28	no market		
Edison P. C. bonds[19]	7-14-28	80	.....	
Fredonia P. C. 1st 6½'s[32]	12-28-27	97	101	
Giant P. C. com.[25]	8- 9-28	25	30	
Giant P. C. pfd.[25]	8- 9-28	30	34	3½% June 15
Ideal Cement, new com.	8-14-28	72	74	$1 qu. July 1
Ideal Cement 5's, 1943	8-11-28	102	103	
Indiana Limestone 6's	8-13-28	91¾	92	
International Cem. com.	8-13-28	63	63⅛	$1 qu. June 29
International Cem. bonds 5's	8-14-28	95	95½	Semi-ann. int. payable June 15
Kelley Is. L. & T. new st'k	8-14-28	52	54	62½c qu. July 2
Lawrence P. C.[2]	8-13-28	105	109	2% qu.
Lehigh P. C.[2]	8-13-28	45	48	62½c Aug. 1
Lehigh P. C. pfd.[2]	8-13-28	110	110¼	1¾% qu. July 2
Lyman-Richey 1st 6's, 1932[13]	8-10-28	99	100	
Lyman-Richey 1st 6's, 1935[13]	8-10-28	98	100	
Marblehead Lime 1st 7's[14]	8-10-28	100	.....	
Marbleh'd Lime 5½'s, notes[14]	8-10-28	98	.....	
Mich. L. & C. com.[19]	8-13-28	35	.....	
Missouri P. C.	8-13-28	45	48	50c qu. Aug. 1
Monolith P. C. com.[9]	8- 9-28	15¾	16¼	8% ann. Jan. 2
Monolith P. C. pfd.[9]	8-9-28	9½	10	
Monolith P. C. units[9]	8- 9-28	34¾	36¼	
National Cement 1st 7's[33]	8-10-28	99	101	
National Gypsum A com.[33]	8-15-28	26	28	
National Gypsum pfd.[35]	8-15-28	64	67	1¾% qu. Apr. 1
Nazareth Cem. com.	8-10-28	30	32	75c qu. Apr. 1
Nazareth Cem. pfd.	8-10-28	103	107	
Newaygo P. C.†	12-30-27	115	.....	
Newaygo P. C. 1st 6½'s[32]	2-11-28	120	.....	
New Eng. Lime pfd., A[45]	8-11-28	94	97	
New Eng. Lime pfd., B[22]	8-13-28	97	99	
New Eng. Lime com.[22]	8-13-28	32	35	
New Eng. Lime 1st 6's[14]	8-10-28	98	100	
N. Y. Trap Rock 1st 6's	8-14-28	100	100	
North Amer. Cem. 1st 6½'s	8-14-28	76	78	
North Amer. Cem. com.	8-10-28	7	7	
North Amer. Cem. 7% pfd.[19]	7-14-28	.....	38	$1.75 qu. Aug. 1
North Shore Mat. 1st 5's[15]	8-15-28	99	.....	
Northwestern States P. C.[37]	8-10-28	195	205	
Pac. Coast Cem. 6's, A	8- 9-28	96	98	
Pacific P. C. new com.[5]	8- 9-28	20	22	
Pacific P. C. pfd.	8- 9-28	77	78	$1.62½ qu. Apr. 5
Pacific P. C. notes[5]	3-22-28	99	.....	3% s.-a. Oct. 15
Pacific P. C. 6's	7-28-28	98	100½	
Peerless Egyp'n P. C. com.[1]	8-13-28	2	2⅛	
Peerless Egyp'n P. C. pfd.[1]	8-13-28	80	90	1¾% qu. July 1
Penn-Dixie Cem. 1st 6's[29]	8-15-28	94	94½	
Penn-Dixie Cem. pfd.[28]	8-15-28	79	80⅛	$1.75 qu. July 1
Penn-Dixie Cem. com.	8-15-28	14⅞	15¼	50c qu. July 1
Petoskey P. C.	8-14-28	9¼	10	1½% qu.
Pittsfield L. & S. bonds[31]	10- 8-27	.....	100	
Pittsfield L. & S. com.[31]	10- 8-27	.....	25	
Riverside P. C. 1st pfd.	7-27-28	180	.....	$1.50 Aug. 1
Riverside P. C., A	8.10-28	21	.....	31¼c cum. part. Aug. 1
Rockland-Rockport Lime 1st pfd.[10]	5-17-28	.....	100	3½% s.-a. Feb. 1
Rockland-Rockport Lime 2nd pfd.[10]	5-17-28	.....	60	3% s.-a. Feb. 1
Rockland-Rockport Lime com.[10]		no market		1½% qu. Nov. 2
Sandusky Cem.	8-14-28	205	.....	$2 qu. July 2
Santa Cruz P. C. bonds	8- 9-28	105¾	.....	6% annual
Santa Cruz P. C. com.	8- 9-28	90	92½	$1 qu. Apr. 1
Schumacher Wallboard com.	8-10-28	17	18	50c May 15
Schumacher Wallboard pfd.	8-10-28	.....	25½	
Southwestern P. C. units[44]	8-10-28	270	.....	
Superior P. C., A[20]	8- 9-28	45	47	27½c mo. Aug. 1
Superior P. C., B[20]	8- 9-28	30	33	
Trinity P. C. units[37]	8-10-28	155	160	
Trinity P. C. com.[37]	8-10-28	48	.....	
U. S. Gypsum com.†	8-15-28	55½	56½	2% qu. Sept. 30
U. S. Gypsum, rts.	8-15-28	14¾	15	
U. S. Gypsum pfd.	8-15-28	126	.....	1¾% qu. Sept. 30
Universal G. & L. com.[3]	8-15-28	75c	1½	
Universal G. & L. pfd.[3]	8-15-28	9	12	1½% Feb. 15
Universal G. & L., V.T.C.	8-15-28	no market		
Universal G. & L. 1st 6's[3]	8-15-28	.....	62	
Upper Hudson Stone 1st 6's, 1951[32]	12-28-27	92	.....	
Vulcanite P. C. 1st 7½'s[32]	12- 5-27	105	109	
Chas. Warner com.	8-13-28	33	36	50c qu. July 10 & 25c ex.
Chas. Warner pfd.	8-13-28	109	.....	1¾% qu. July 26
Whitehall Cem. Mfg. com.[36]	8-10-28	150	.....	
Whitehall Cem. Mfg. pfd.[36]	8-10-28	90	.....	
Wisconsin L. & C. 1st 6's[15]	8-15-28	100	.....	
Wolverine P. C. com.	8-14-28	5½	6¾	15c qu. Aug. 15
Yosemite P. C., A com.[20]	8- 9-28	.....	10	

†10% stock dividend, July 10. U. S. Gypsum common holders of record July 14 have the right to purchase new common at $20 a share to the extent of 50% of holdings. Right expires Oct. 1. Payments of 25% are due: Oct. 1, 1928; Feb. 1, June 1, and Oct. 1, 1929.

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, Chicago, Ill. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif. [45]Tifft Bros., Pittsfield, Mass.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Asbestos Corp. of Amer., 5 sh. pfd., 5 sh. com.[1]	$1 for the lot	.....
Atlanta Shope Brick and Tile Co[1]	25c	.....
Benedict Stone Corp. (cast-stone), 50 pfd., 390 com.[1]	$400 for the lot	.....
Benedict Stone Corp. 1st 7's 1934[8]	.....	86
Blue Stone Quarry, 60 sh.[3]	$10¼ for the lot	.....
Eastern Brick Corp., 7% cum. pfd.[1]	40c	.....
Eastern Brick Corp. (sand lime brick) com.[1]	40c	.....
International Portland Cement Co., Ltd., pfd.	30	45
Globe Phosphate Co., $10,000 1st. mtg. bonds, $169.80 per $1000 paid on prin.	$50 for the lot	.....
Iroquois S. & G. Co., Ltd., 2 sh. com., 3 sh. pfd.[1]	$12 for the lot	.....
Knickerbocker Lime Co.[4]	105	.....
Missouri Portland Cement Co., 7% serial bonds	104¾	104¾
Olympic Portland Cement Co.[7]	.....	£1⅝
Phosphate Mining Co.[1]	1	.....
River Feldspar & Mill'g Co., 50 com., 50 pfd.[1]	$200 for the lot	.....
Rockport Granite Co., 1st 6's, 1934	90	.....
Simbroco Stone Co.[2]	12	12
Simbroco Stone Co.,[9] 40 sh. pfd., par $50; 40 sh. com., par $10 (40 units)	$2 per unit	.....
Simbroco Stone Co.,[10] 10 sh. pfd., par $50	$10.25 per sh.	
Southern Phosphate Co.[6]	1¼	.....
Tensas Gravel Co., 180 sh. com.[1]	$1 for the lot	.....
Tidewater Portland Cement Co., 3000 sh. com.	$6525 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Wabash Portland Cement Co.[1]	60	100
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by R. L. Day and Co., Boston. [3]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [7]Neidecker and Co., London, England. [8]Auction sale of $1000, Barnes & Lofland, Philadelphia, March 31, 1928. [9]Price at auction May 2, 1928, by Wise, Hobbs & Arnold, Boston. [10]Price at auction, June 6, 1928, R. L. Day & Co., Boston, Mass.

Blue Diamond Company, Los Angeles, Bond Issue

THE BLUE DIAMOND CO., Los Angeles, Calif., through the First Securities Co., Los Angeles, is offering $950,000 in first mortgage 6% serial gold bonds. The following data are supplied by William C. Hay, president of the Blue Diamond Co.:

Company and Business—The Blue Diamond Co. was organized under the laws of the state of California in January, 1924, as a successor to a business which had its inception in 1918. The company is engaged in the production, manufacture and distribution of a wide variety of basic building materials and is the largest company of its kind on the Pacific coast and one of the largest in the United States. Among the principal products produced, manufactured and distributed by the Blue Diamond Co. are gypsum, various kinds of plaster, agricultural lime, industrial lime, hydrated lime, mortar, putty, stucco, sand, gravel, crushed rock, plastering materials, cement, reinforced steel, and various other materials used in the building and construction industry. The products produced and sold go into every phase of the building industry and for use in the construction of highways, streets, curbs, sidewalks, gutters, railroads, sewers, wharves and other construction projects. The products of the company are marketed, both wholesale and retail, over the entire Pacific coast and are exported in increasingly large amounts to the Hawaiian Islands, the Orient, and to New Zealand.

The company's plants are mechanically modern and the company maintains a fleet of about 73 heavy trucks and 10 trailers, with capacities ranging up to 10 tons each, to service its operations in the southern California territory.

Security and Valuation—The Blue Diamond Co. owns a number of valuable properties in southern California, of which the following will be pledged, in the opinion of counsel, to secure these bonds:

(a) Approximately 23½ acres of very valuable real estate, situated at 16th and Alameda streets, Los Angeles, on which are located the main office and chief manufacturing and distributing plants of the company. This property is one of the largest close-in pieces of industrial real estate in the city of Los Angeles, being situated within two miles of the heart of the business district. Aside from the business of the company, this real estate possesses very great value for general industrial purposes and is served by four railroads: Atchison, Topeka and Santa Fe, Southern Pacific, Union Pacific, and Pacific Electric railways. The Roy C. Seeley Co., business and industrial realtors, Los Angeles, have appraised this real estate alone, solely as industrial sites, as of June 15, 1928, at $1,698,423.75, or more than 1.78 times this bond issue.

(b) Buildings and major items of permanent operating equipment, including automobiles and trucks, at 16th and Alameda streets, appraised as of May 31, 1928, by the American Appraisal Co. at a sound value after depreciation of $881,000.

(c) Approximately 1000 acres near Corona, Calif., the base of the company's crushed rock activities and on which is located an almost limitless supply of the finest grade of trap rock, and approximately 86 acres of sand and gravel deposits, at El Monte, Calif., which have been appraised at a nominal value of $159,200; a total valuation of the pledged properties of $2,738,623.75.

The total valuation of $2,738,623.75 of the properties which will secure these bonds is more than 2.88 times the amount of the issue, which therefore constitutes a loan of less than 35%. These bonds will be also secured, in the opinion of counsel, by a direct mortgage on all real property, improvements, equipment, automobiles and trucks hereafter acquired by the company.

A bondholder's policy of title insurance in the amount of $950,000 will be issued by the Title Guarantee and Trust Co., Los Angeles, insuring these bonds to be a first lien on the real property to be pledged, subject to the lien of current taxes not delinquent.

Other Properties—In addition to the properties described above, which will be pledged to secure these bonds, the company owns 40 acres of land in Burbank suitable for residential purposes, and approximately 15 acres of industrial property located between Beverly boulevard and Third street, at the junction of the Pacific Electric—Gardner Junction line in Beverly Hills. It maintains a branch office and yard in Hollywood fully equipped to serve that wide territory in the rapidly growing western district of the city.

Through a subsidiary, the Blue Diamond Co. of Nevada, the company controls one of the finest deposits of gypsum in the West. The property of the Nevada company, at Arden, Nev., comprises about 1000 acres and is one of the most modern mining operations in the West. The gypsum is transported by means of a large aerial tramway to the company's privately owned railroad, which in turn connects with the Union Pacific railroad at Arden, where it is brought to Los Angeles for manufacturing. This deposit is the purest gypsum in this vicinity and the available supply is considered sufficient for the company's requirements for many years beyond the last maturity of these bonds.

About 90% of the outstanding $500,000 common stock of the Blue Diamond Co. of Nevada is owned by the Blue Diamond Co. of California. The latter company has agreed that should any of the properties of Blue Diamond Co. of Nevada be sold, the proceeds of such sale up to $200,000 shall be applied either to the retirement of bonds of this issue or to the purchase of other properties of equal value, which shall then be subjected to the first lien of the trust indenture to secure these bonds.

Sales and Earnings—Since the inception of the business in 1918, the management of the Blue Diamond Co. has remained the same. The growth of the company is evidenced by the following tabulation of net sales for the calendar years 1918 to 1927, inclusive:

1918	$ 57,305	1923	$3,626,315
1919	387,555	1924	3,738,783
1920	1,311,856	1925	3,658,762
1921	1,644,866	1926	5,645,677
1922	2,633,324	1927	5,693,537

For the four years ended December 31, 1927, the consolidated net earnings of the company and its subsidiaries available for bond interest, bond discount and expense, and federal income tax, as certified by Peat, Marwick, Mitchell and Co., accountants and auditors, after depreciation, depletion and amortization (but eliminating losses on capital assets averaging $27,274,56 per annum), have been as shown in the table below.

The net earnings as shown below available for bond interest have averaged annually $264,849.74 or over 4.64 times the maximum annual interest charges of $57,000 on these bonds and over 2.73 times the average annual amount required for the payment of the principal and interest on this issue, namely, about $97,000.

Current Position—The consolidated balance sheet of the company and its subsidiaries as of June 30, 1928, as prepared by the company and adjusted to give effect to this financing shows current assets of $1,036,614.05 and current liabilities of $190,811.79, a ratio of current assets to current liabilities of 5.43 to 1 and a net working capital of $845,802.26.

Net tangible assets, after deducting all liabilities except this bond issue, amounted to $4,136,723.35, or at the rate of $4354 for each $1000 bond of this issue.

Purpose of Issue—The proceeds to be derived from the sale of these bonds will be used by the company the pay the remaining $729,000 of an original issue of $1,000,000 first mortgage 7% bonds due February 1, 1939, which have been called for redemption on August 1, 1928, and for other corporate purposes.

Special Provisions—In addition to the regular semi-annual payments, the trust indenture will provide for a special fund based upon depletion of the rock, sand, gravel and/or other material deposits securing these bonds. This fund will require the impounding of 5 cents for each ton of such material removed and shall be used exclusively for the retirement of bonds of this issue and/or the purchase of additional properties and/or the purchase of securities having a recognized collateral loan value.

The trust indenture will also provide that the company shall always maintain, while any of these bonds are outstanding, current assets equal to at least two times its current liabilities; and that the company shall carry adequate fire and use and occupancy insurance and also such other insurance as is customarily carried in connection with its business.

Maturities of Issue—This issue of $950,000 bonds will mature and be payable semi-annually in amounts ranging from $21,000 to $48,000 annually from December 1, 1928, to December 1, 1943.

ASSETS

Current Assets		
Cash		$ 260,958.69
Accounts and notes receivable	$581,610.19	
Less reserve for bad debts	23,617.36	557,992.83
Inventory		217,662.53
Total current assets		$1,036,614.05
Special accounts receivable (non-current)		100,366.99
Stocks and bonds		17,937.50
Prepaid expenses		31,724.90
Land—(less reserve for depletion)		1,921,239.57
Plant and equipment (less reserve for depreciation)		1,328,841.22
Deferred charges		144,483.11
Total assets		$4,581,207.34

	1927	1926	1925	1924
Net earnings, before depreciation, depletion, amortization and federal income tax, after adjustment to give effect to the elimination of interest (and other charges) on obligations to be retired through this financing	$457,229.77	$611,962.51	$390,211.18	$422,119.95
Deduct:				
Depreciation and depletion	$229,899.13	$238,455.60	$174,293.90	$129,475.82
Amortization of cost of agencies and selling contracts	25,000.00	25,000.00	.....	.....
	$254,899.13	$263,455.60	$174,293.90	$129,475.82
Net earnings available for bond interest, bond discount and expense and federal income tax	$202,330.64	$348,506.91	$215,917.28	$292,644.13

LIABILITIES

Current Liabilities	
Accounts payable (purchases)	$ 170,142.16
Accrued payrolls	13,877.29
Federal income tax	6,792.34
Total current liabilities	$ 190,811.79
Deferred liabilities	77,464.19
First mortgage 6% serial bonds	950,000.00
Capital stock	2,050,000.00
[20,000 shares common at $100 (50,000 shares authorized), 500 shares Blue Diamond Co. of Nevada common at $100 (minority interest).]	
Surplus	1,312,931.36
Total liabilities	$4,581,207.34

Kentucky Consolidated Stone Company Initial Dividend

DIRECTORS of the Kentucky Consolidated Stone Co., the new consolidation of a number of the commercial stone producers of Kentucky, met recently and declared an initial quarterly dividend of $1.75 per share, on the trustees certificates, payable on August 1, to stock of record on July 15. The certificates were recently offered in the local market at 100 and the stock listed on the Louisville Stock Exchange.

Riverside Cement Listed on Los Angeles Exchange

THE Riverside Cement Co. common and preferred stock has been added to the listings of the Los Angeles Curb Exchange, officials of the exchange announced recently. The listing consists of 65,000 shares of first preferred no par value $6 stock and 240,000 of class "A" no par $1.25 stock.

The Riverside Cement Co. was formed by the recent reorganization of Riverside Portland Cement Co. Regular quarterly dividends on both classes of stock have been declared payable August 1 to shareholders of record the 14th inst.

(British) Holborough Cement Co., Ltd., Earnings

THE second ordinary general meeting was held on May 24, H. S. Horne (chairman) presiding, and the report was approved.

The report for 1927 stated that during the year the remainder of the authorized capital has been issued, so making the total share capital £500,000. After charging all expenses, including maintenance repairs, the net profit was £62,548, plus £16,238 brought in. The directors recommended that preliminary expenses, commissions and brokerages be written off, £39,175; a provision made for depreciation of £20,000; writing off balance of compensation to late officials of the company, £7975; leaving £11,636 to be carried forward. The directors stated that the profits would have allowed of a dividend being paid, but they considered it best to deal with the earnings as set out above, and so consolidate the balance sheet.

During the year extensions had been made to plant and various important accessories, which made the company one of the best mechanically equipped and most up-to-date cement units of its size in the United Kingdom. A material decrease in manufacturing costs had been effected, which made it possible to meet satisfactorily the keen competition prevailing. Storage capacity had been increased by over 150% by building a modern silo type of warehouse which permitted storing cement on specific contracts and was independent of the weather. Special arrangements were provided for dealing with the company's Vitocrete brand, which was meeting with universal approval as a result of its qualities as a super rapid-hardening cement.—*Chemistry and Industry*, London, England.

Recent Dividends Announced

THE following dividends of corporations in the rock products field, or with interests in this field, have been announced during the past two weeks as follows:

Celite Co. com. (quar.)	50c, Aug. 1
Cleveland Stone Co. extra dividend	25c, Sept. 1
Consolidated Sand and Gravel, Ltd., 7% pfd. (quar.)	1¾%, Aug. 15
Dolese and Shepard (quar.)	$2 Oct. 1 and $1 extra Oct. 1
Indiana Limestone Co. pfd. (quar.)	1¾%, Sept. 1
Kentucky Consolidated Stone Co. trustees certificates (quar.)	$1.75, Aug. 1
United States Gypsum com. (quar.)	2%, Sept. 30
United States Gypsum pfd. (quar.)	1¾%, Sept. 30
Virginia-Carolina Chemical prior pfd. (quar.)	1¾%, Sept. 1
Virginia-Carolina Chemical participating pfd. (No. 1)	3%, Sept. 1

U. S. Gypsum Makes Good Net Showing

DESPITE SEVERE COMPETITION in the gypsum industry, with the resultant drastic reductions in prices, the United States Gypsum Co. and subsidiaries for the six months ended June 30 last report a consolidated net income of $3,334,487 after depreciation, depletion, federal taxes and all other charges, equal after preferred dividends to $4.43 a share earned on 691,502 shares of $20 par common stock outstanding. This compares with a net income of $3,892,302 in the corresponding period of last year, equal to $5.25 a share on 688,273 shares of common stock.

At the same time the company increased its working capital accounts to $14,758,420, of which $767,671 was represented by cash and $7,298,260 by United States government securities. At the close of 1927 the company had a net working capital of $12,983,887 and as of June 30, 1927, the excess of current assets over current liabilities was $11,777,146.

Reduce Preferred Stock

Inventories stand at $2,936,892, as against $3,341,907 six months before and $3,768,421 a year ago. The outstanding preferred stock shows a reduction of approximately $300,000 during the last year. The surplus account as of June 30 was $26,773,031, as compared with $24,233,219 at the close of 1927 and $21,901,522 as of June 30, 1927.

A comparison of the consolidated income account for the six months ended June 30 follows:

	1928	1927
Total earnings	$ 4,389,577	$ 5,023,556
Federal taxes	437,004	590,311
Depletion and depreciation	618,086	540,943
Net profit	3,334,487	3,892,302
Dividends—cash	824,346	828,106
Surplus	2,510,141	3,064,196

A comparison of the consolidated balance sheet as of June 30 with that of the year before follows:

ASSETS

	1928	1927
Plant and property	$35,643,974	$33,102,540
Gypsum and gypsite	5,727,500	5,727,500
Treasury holdings	176,984	169,706
Deferred charges	730,769	714,990
Current assets:		
Cash	767,671	587,077
U. S. government securities	7,298,260	3,924,781
Receivables	5,581,224	5,602,665
Advances	404,557	753,484
Inventories	2,936,892	3,768,421
Total current	$16,988,604	$14,636,428
Total assets	$59,267,831	$54,351,164

LIABILITIES

Common stock	$13,830,040	$13,765,460
Preferred stock	7,841,700	8,141,600
Reserves	8,592,877	7,683,300
Surplus	26,773,031	21,901,522
Current liabilities:		
Accounts payable	702,453	1,051,057
Accrued taxes, etc.	1,527,730	1,808,226
Total current	$ 2,230,184	$ 2,859,262
Total liabilities	$59,267,831	$54,351,164

Commenting on the report for the first six months of the year, Sewell L. Avery, president, said the competitive condition is increasingly severe, notwithstanding sustained demand for the company's products.

"It is anticipated that the large demand will continue through 1928, but there seems to be no present justification for excepting any material change in existing conditions," Mr. Avery said.—*Chicago* (Ill.) *Journal of Commerce.*

John W. Boardman

JOHN W. BOARDMAN, JR., vice-president and sales manager of the Huron Portland Cement Co., Detroit, Mich., died August 3 at the Mercy hospital, Jackson, Mich., following an operation performed 10 days before.

Mr. Boardman started in the cement business at Jackson with the Peninsular Portland Cement Co., but later moved to Detroit when he entered the service of the Huron Portland Cement Co. He leaves a wife and three children and a brother, Harry D. Boardman, of Jackson. He was 43 years old.

Mr. Boardman was prominent in the affairs of the Portland Cement Association and was at one time treasurer of the organization. He was a member of the American Society for Testing Materials and other business and scientific associations.

More Details on Houston's Oyster-Shell Lime Plant

ROCK PRODUCTS is informed that contracts have been let by the W. D. Haden Co., Houston, Tex., for a 7-ft. by 125-ft. rotary kiln and a 6-ft. by 60-ft. rotary cooler to the Traylor Engineering and Manufacturing Co., Allentown, Penn. The plant is to manufacture lime from oyster shells, and so far as can be learned at this time, will be the first of its kind in any part of the world. Arnold and Weigel, engineers and manufacturers, Woodville, Ohio, are designing the plant.

Cecil Haden, treasurer of the W. D. Haden Co., writes: "The place where this plant will be located has already been cleared, and at the present time we have a crew busy making the necessary cuts and fills preparatory to laying railroad tracks into the property. A 6-in. water well is also being drilled. Some of this work, of course, will be let out by contract, but the construction of the lime plant itself will be done by day labor under the supervision of our local engineer, William A. Brunet. We hope to have our plant in operation by January 1, 1929."

Natural gas will be used for fuel. The estimated cost of the plant including a crushing plant for chicken grits, etc., is $350,000.

Progress on Ash Grove Cement Mill at Louisville, Neb.

THE *Courier* editor spent a short time recently viewing the progress of the work of construction of the big two million dollar cement plant of the Ash Grove Lime and Portland Cement Co.

The 260-ft. smoke stack at the plant has been completed. The work was done by the Heine Chimney Co., of Chicago, and is a most commendable piece of work. The stack, which is erected just west of the raw material silos, is to carry the smoke and gas from the big rotary kilns. All machinery is to be run by electricity. Superintendent Frolich says he is especially well pleased with the construction of the smoke stack and thinks it one of the neatest jobs he has seen.

L. N. Howell, erecting engineer for the Allis-Chalmers Manufacturing Co., of Milwaukee, Wis., is in charge with Gene Wheeler of the Ash Grove company in placing the heavy machinery for the rotary kilns. The kilns will be 260 ft. in length. The raw material enters at the east end from the mixing silos.

While visiting the plant the *Courier* editor met C. E. Sutton, chemist, who recently arrived here from Chanute, Kan. Mr. Sutton has very pleasant quarters in the basement of the raw material silo building near the east end of the plant. Equipment for his office is just beginning to arrive. He and his family are housed in one of the company cottages down on the river road.

One of the very large buildings under course of construction will contain the cement storage silos. It is being built at the west end of the rotary kilns. There will be sixteen of these silos and they will be 85 ft. in height. They are being constructed by the Industrial Engineering Co., of Kansas City, Mo. The 85-ft. tanks will rest on a base of some 20 ft. in height, which adds just that much to the height of the tanks. The forms for the silos have been completed and they are pouring cement. They estimate that it will take ten days, working night and day, to complete them.

O. A. Anderson and Sons, contractors, of Lincoln, Neb., have begun work on the erection of a 40x40-ft. six-room bungalow on North hill for Superintendent A. K. Frolich. It is located on the site formerly owned by H. N. Taylor, and is a most beautiful location. It is at the south entrance of Ash Grove Heights, which is soon to be made a part of the city. Assistant Superintendent Fred Brammer's new home to be erected by the same company, will be just east of the Frolich home and will be a one and one-half story building, 36x38 ft. Both of these new homes will be completed and ready for occupancy this fall.

Down near the crusher building a spring of cold, clear water was brought in by a blast and furnishes drinking water for the workmen. It is most welcome this hot weather. It trickles down from a crevice in the rock and is utilized for drinking purposes.

The heavy growth of timber on the west slope of the hill east of the old Stout mansion has been cut down and cleared away and soon steam shovels will be put to work opening up a quarry. The rock will be quarried by surface stripping as long as it is practical, after which tunnels will be driven into the hill.

Work in every department is progressing and there is not a minute, day or night, Sundays included.

The rock storage bins at the extreme east end of the plant, where the rock from the quarry will be dumped, resembles a cathedral in dimensions. Several railroad cars may be pushed in at one time and the unloading will be done by huge cranes and steam shovels.—*Louisville* (Neb.) *Courier.*

New Asbestos Products to Be Made in Rockford, Ill.

PAPERS of incorporation have been filed by four Rockford, Ill., men for the charter of a company here to manufacture a new plaster, "Stoneite," which has been invented by Haughton Brown.

The incorporators are Messrs. Brown, Jesse Barloga, John Westerberg and Fred Ahlstrand. A. R. Floberg is also interested in the concern.

The new plaster, which is made from asbestos, has been manufactured for the past seven months and trial conducted with it. According to Mr. Brown, the plaster is very strong and has not cracked in any of the test jobs.

The new firm is now located at 1825 16th avenue, the building formerly occupied by the Rockford Smelting and Refining Co.—*Rockford* (Ill.) *Republican.*

Imports of Cement Rise in Half Year

IMPORTS OF CEMENT into the United States increased and exports of cement from this country decreased during the first six months of 1928, according to comparative figures for January to June, 1927 and 1928, made public by the Department of Commerce on July 31. Belgium was the principal exporter of cement to the United States, and supplied the American market with 89% of its imports, it was said. The statement follows in full text:

There were 266,537 bbl. of cement (free and dutiable) valued at $359,637 imported during the month of June. This is a quantitative increase of 106% over those of June, 1927, when 129,111 bbl. valued at $201,682 were imported. Belgium furnished 237,886 bbl. (89% of the total) valued at $312,471 during June, 1928; for the corresponding month of 1927 it furnished 107,760 bbl. (84% of the total) valued at $163,846.

Imports of cement for the first six months of 1928 totaled 1,336,827 bbl. valued at $1,831,276, compared with imports of 1,004,649 bbl. valued at $1,510,422 for the corresponding period of 1927.

Exports of cement from the United States during June, 1928, amounted to 59,536 bbl. valued at $201,313. This is a quantitative decrease of 14% from American exports of this commodity in June, 1927, when 69,205 bbl. valued at $237,281 were exported. During the first six months of 1928 the United States exported 385,596 bbl. valued at $1,335,414; for the corresponding period of 1927 American exports of cement amounted to 415,626 bbl. valued at $1,414,909.

Correction

SIR—In an editorial insert on page 72, of ROCK PRODUCTS, July 7, there is made this statement: "Limestone and gypsum rock-dust are the only healthful ones to employ in bituminous coal mines to prevent explosions and fires." This is a misstatement of facts as investigations by the U. S. Bureau of Mines indicate other materials are harmless provided they conform to the following specifications:

There shall not be more than 5% of combustible matter nor more than 25% of quartz or free silica particles. The Bureau makes this statement: "Rock-dust may be made from limestone, dolomite, gypsum, anhydrite, shale, talc, adobe, or other inert material which meets the foregoing specifications."

C. W. OWINGS,
Associate Engineer,
U. S. Bureau of Mines.
Washington, D. C., July 28, 1928.

Good Lighting as an Aid to Plant Safety

Paper Read at the Pittsburgh (Penn.) Regional Safety Meeting of the Portland Cement Association

By R. G. Morison
District Illuminating Engineering, Edison Lamp Works, New York, N. Y.

WHILE ARTIFICIAL ILLUMINATION is far from being a new development, it has only been within a comparatively few years that it has had such an important bearing on human welfare and progress as is being experienced today. It is now possible to carry on our activities without interference from darkness or cloudy weather, since we have available reliable means of artificial illumination, chiefly through the medium of the incandescent electric lamp and suitable accessories.

R. G. Morison

With our modern ideas and methods of illumination, not only is it possible to accomplish suitable working intensities much more economically than in the past, but in addition it has been definitely proved that good lighting is an important factor in the prevention of accidents, increasing plant output, and promotion of employes' welfare generally.

During the past few years it has been proved that artificial illumination is satisfactory for practically every process in industry when properly applied, and in some cases is superior to natural daylight. Yet, if installed in a haphazard way a lighting system may be troublesome, annoying and even dangerous.

Let us analyze some of the conditions with which we must cope in artificial illumination. In the first place, present sources of artificial illumination are of a concentrated nature, made necessary by inherent characteristics of materials used in the incandescent lamp, and by necessity of economy in construction of building are placed relatively close to the eyes of the worker. Sunlight, on the other hand, comes from a larger source and becomes in part diffused by passing through the atmosphere. With artificial illuminants, therefore, it is usually necessary to provide means of diffusing the light, which might otherwise tend to paralyze the optical system.

Another effect which results directly from a light source placed relatively close to the working plane, is that of shadow. Care must be exercised with the installation to make sure that shadows are eliminated or kept at a minimum.

A third condition is that of too low intensities of illumination, which may be attributed chiefly to economic conception. Not very many years ago it was practically impossible to obtain by artificial means sufficient illumination for efficient plant operation, and such illumination as was produced was expensive. It is somewhat natural, therefore, that the idea of "light saving" grew, and the thought now often prevails, "Use as little as possible, and turn the lights out at every opportunity." The result, according to recent statistics, is that over 60% of the industrial plants throughout the country are underlighted or improperly lighted.

It is not difficult to understand how these factors have a bearing on the subject of safety. With glaring, unshaded lights, it is quite possible for a workman to become temporarily blinded, a condition which may often cause a serious accident.

The eye can be compared to a delicate camera in which a continuous photograph is being taken. The eye has its shutters, it stops, its lens and films just like the camera. A large quantity of light suddenly projected into range of vision paralyzes the optic system just as the film or the plate of the camera will "fog" unless adjustments are properly made. Nature has a way of compensating for such things, but the muscles do not act instantaneously, and before adjustment takes place unfortunate happenings occur. I am sure that everyone has had sufficient personal experience with glare to realize the danger which may accompany it.

Harsh and heavy shadows, caused possibly by poor lighting arrangements, often conceal dangerous objects or conditions, as, for example, one on which it would be easy to trip or stumble or misstep. Did you ever realize that of the five senses with which the human being is endowed, the sense of sight is the only one which requires an outside agency for operation? Without light there is no sight. Low intensities decrease the range of visibility, strain the eye, and generally lower the degree of light protection to the individual.

Not long ago I was in a factory where a large number of machinists were employed on highly specialized work. The majority of them were men 50 years or older, and I noticed that almost without exception each man wore glasses. The lighting conditions were most unfavorable for the detailed work required. In answer to my inquiry, the manager stated that most of the men had been in the employ of the company for a good many years. I could not help but wonder if the eyesight of those men had not been materially impaired by the lack of proper artificial illumination through those years.

The process of seeing depends to a very large extent upon the amount of light thrown on any object looked at, and is the basis for present-day theories and methods of illumination. Different types of work require varying intensities of illumination. It is obvious that in areas where rough work is being carried on that moderate intensities will suffice, and that in areas where fine work is done, such as polishing, engraving and drafting, much higher intensities are necessary.

That many operations in industrial establishments are of a hazardous nature has long been recognized, and it is the universal practice to provide mechanical guards for dangerous machines. The workers are warned and reminded to take every precaution possible, and through such means the accident hazard has been considerably reduced.

Accidents undoubtedly occur due to improper illumination, yet for some reason or other it is very difficult to obtain records of accidents which were attributed to this cause. Insurance companies, however, have made a study of the problem and have given out statistics that of all industrial accidents, 12% to 20% of them are caused by poor lighting.

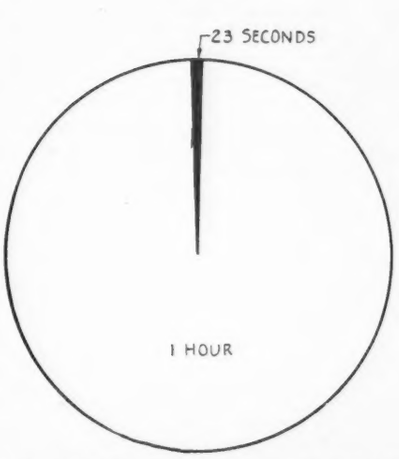
When we consider that the type and quality of illumination has direct bearing on the

worker's vision, consequently on his action, we can be certain that it must have an effect on accidents. As a result, those who have studied illumination and its relation to industry feel that they are justified in recommending adequate intensities of artificial illumination purely on the basis of protection against accidents.

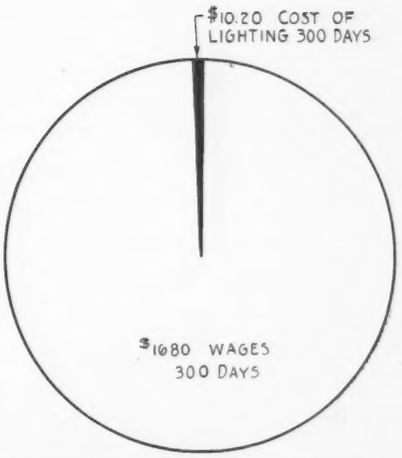
Many plant owners and engineers fail to provide proper lighting facilities because they have the notion that lighting is expensive. Twice as much illumination can be obtained for a given expenditure today as was obtainable 15 years ago. This has been brought about by the improved and lower priced Mazda lamp, more efficient methods of light direction and control, and lower cost of electric current due to improved methods used in its manufacture and distribution.

Some state that their plants have adequate daylight, or that no night work is done in their plants. Statistics show that 142 days of the year are cloudy, when it is necessary to supplement daylight with artificial light. Then, too, daylight varies considerably. One worker may have excellent light during the morning of a clear day, but very little in the afternoon, depending upon his location in respect to the points of the compass. It is also true that in terms of man-hours worked the greatest number of accidents occur during the winter months when we have the least amount of sunlight. This is not only an indication, but positive proof that light has a considerable bearing on the subject of plant safety.

With these observations and facts at our disposal, it would seem that a well-designed lighting system would be well worth while and might be expected to prove economical very soon, even though the initial cost and maintenance were comparatively high. Those who are vitally interested in industrial safety and know the many penalties upon a plant with a high accident rate, would heartily agree, even were no other economies effected by good lighting. But in addition, a good lighting installation pays for itself and will actually pay big dividends as well. If proper illumination enables a worker to see more clearly and without fatigue; if his quickness of perception is increased; if his surroundings are thereby made invigorating rather than depressing, then that worker unconsciously and without effort produces more efficiently.



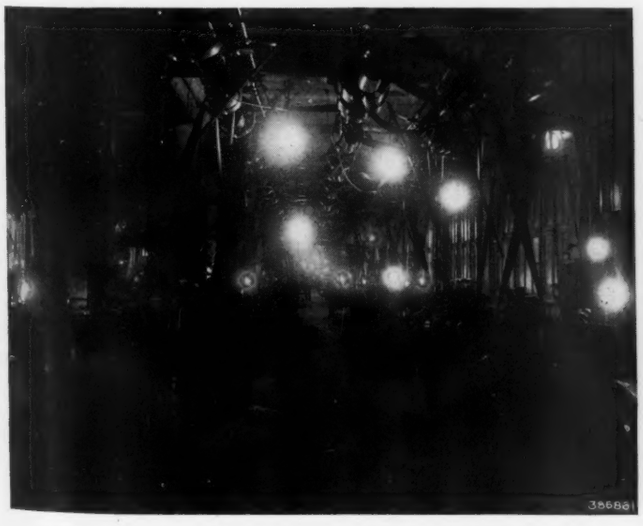
Lighting Cost vs. Time—This chart shows the cost of proper lighting for one hour is equal to one workman's wage for 23 seconds. So if each workman is able to save 23 seconds an hour the lighting installation pays for itself



Lighting Cost vs. Wages—As shown in the above chart the cost of maintaining an efficient lighting installation is only 0.6% of a workman's yearly wages. These figures are based on an 8-hour day with wages at 70c an hour

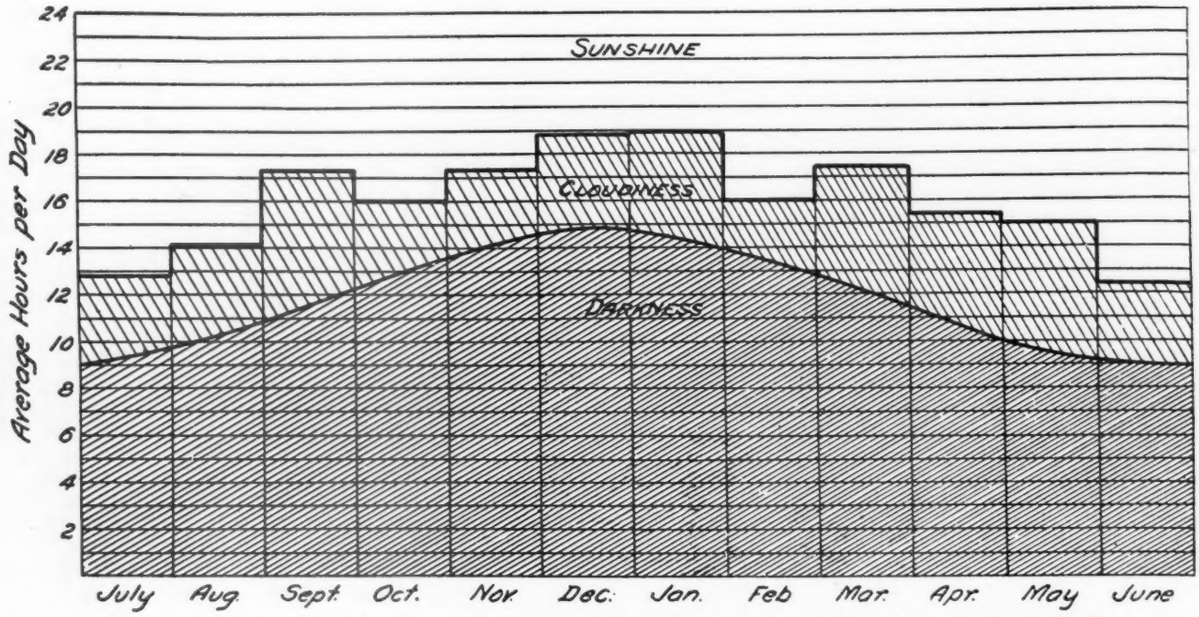
That adequate illumination will certainly influence production is not a theory but a fact that has been proved by "before and after" tests which have been made by specialists in industrial plants covering widely different fields of operation. One of the most complete tests of this order was at the Detroit Piston Ring Co., where the intensity of illumination was raised from 1.2 footcandles to 18 footcandles. Accurate checks on production were made and it was found that the higher intensities resulted in 25% increase in production. Another test was made in the plant of the Timken Roller Bearing Co., where the level of lighting was raised from 5 footcandles to 20 footcandles. There the production increase of the plant was 12.5%. The cost of maintenance, depreciation and investment in both of these installations was less than 2% of the total payroll. Thus it can be seen that good lighting not only pays for itself but is a sound investment on which ample returns are received. Any agency which will pay for itself and at the same time promote safety, speed up output and increase the general welfare of industrial employes deserves first place in the consideration of every plant executive.

Secretary of Labor James J. Davis, speaking before the 49th National Electric Light Convention held at Atlantic City two years ago, said: "When I reflect on the economic saving that might be effected by better lighting; when I reflect on the increased production, the saving of life and limb, and ocular vision, and all that may be done to promote happiness among millions of workers, I am



Old lighting equipment without regard to safety hazards

New lighting equipment designed with "safety first" in mind



Need for effective artificial lighting in any 24-hour-a-day industry is shown by above chart. In December, for example, there is an average of only 5 hours of sunlight per day

Good Lighting as an Aid to Plant Safety*

By W. C. Allen

Illuminating Engineer, Birmingham Electric Co., Birmingham, Ala.

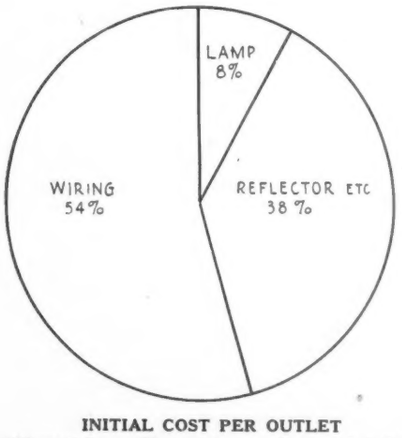
inclined to think that you are too complacent in the presence of certain untoward conditions in industry. All that is humanly possible ought to be done to prevent injury and suffering.

"What does it means that 25% of our industrial accidents are caused by defective lighting? It means that many thousand workers have suffered needlessly. It means disability, death, and all manner of economic evil, not in the name of efficiency and progress, but, as we should say, in the name of pig-headed stupidity. Out of age-long darkness our race has emerged into a light that shall grow more unto the perfect day."

THAT LIGHTING is a vital factor in the promotion of industrial safety is by no means a new idea, but has been advanced by various groups and has been tried and proved successful by many plants. Most outstanding among these groups who have advanced better lighting as an aid to plant safety is the National Electric Light Association, the Illuminating Engineering Society and the insurance companies. Out of 91,000 industrial accidents included in a recent study by one of the large insurance companies, it was found that approximately 25% of these were caused either directly or indirectly by improper lighting.

In a recent survey made by the industrial lighting committee and the National Electric Light Association of 390 typical American industrial establishments it was found that only 15% are well lighted, 29% fairly lighted and 56% poorly lighted. When we realize that sight is the first essential to safety we can see what this condition means. You would not think much of an unguided blind man's chances of avoiding injury in an industrial plant, and this is practically the condition under which workmen in this 56% are working.

Lighting installations in industrial plants are frequently left to electrical contractors who are not capable of making correct installations. Unfortunately, many of these men are purely mechanical and know nothing of the procedure necessary to proper lighting. There are two contributing causes to poor lighting: an adequate quantity of light, and unsatisfactory quality, by which

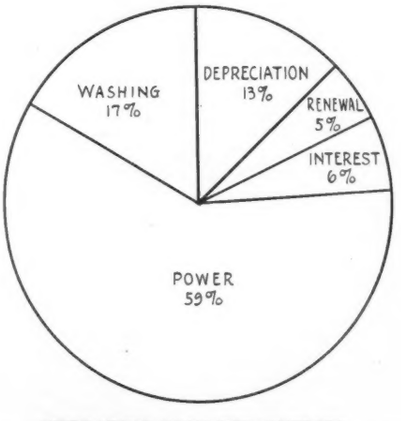


INITIAL COST PER OUTLET

200-watt lamp (list subject to discount)	$ 0.85
Reflectors, etc. (list subject to discount)	4.30
Wiring per outlet (estimated)	6.00
Total first cost	**$11.15**

EFFECT OF INSTALLING SCIENTIFICALLY DESIGNED LIGHTING IN 12 MANUFACTURING PLANTS

Class of Work	Average Old Intensity	Average New Intensity	Average Increase in Production
Rough	3.00%	11.70%	10.00%
Medium	2.86	12.38	16.64
Fine	2.72	12.70	16.70
Average	2.86	12.26	14.45



OPERATING COST PER OUTLET

Interest on investment at 6%	$ 0.67
Depreciation on reflector, socket holder and wiring at 12½%	1.29
Power at 5 cents per kw.hr.	6.00
Cleaning—washed every 12 weeks, wiped every 2 weeks	1.73
Renewal of lamp $\frac{600}{1000} \times .85$	.51
Yearly operating cost per outlet	**$10.20**

*Mr. Allen's paper, which was originally presented at the regional safety meeting of the cement mills at Birmingham on March 15, relate so closely to the preceding article by R. G. Morison, that it is published as of unusual interest in connection with the latter.

we mean illumination wrongly applied. The first of these is caused by the installation of lamps without regard to the footcandle intensity that should be projected on the working plane. This fault can very easily be remedied by referring to any of the handbooks on illumination which give dependable tables showing footcandle intensity for various types of work. A good way to arrive at the proper size lamps to be installed is to provide for rough work one watt per square foot; for average work, 1½ watts per square foot, and for very fine work, 2½ watts per square foot. This can be determined by taking the square foot area of the building to be lighted and multiplying by the constants given and dividing the number of light sources into this total, which will give the size lamp that should be used in each light source.

The other contributing cause of poor lighting is that of unsatisfactory quality produced either by direct glare or shadows. The first of these, direct glare, is usually caused either by the use of the wrong type reflector for the particular application, or the hanging of the light source too low, so that it will be in line of vision of workmen, or in some cases, where it is absolutely necessary to hang the light source low, by not properly shading the reflector. Another cause of direct glare is that of too great contrast between the light source and the background. This can be avoided by having the walls and ceiling of the proper color so that they will reflect the light rather than produce glare. The second of the contributing causes, that of reflected glare, is usually caused by hanging a light source over a polished working surface. This is particularly bad, as the eyes are especially sensitive to light source from below. This can be remedied by properly shading from below or diffusing the source.

The next contributing cause to bad lighting, that of shadows, is either caused by hanging light source above beltings, behind columns, or in positions where cranes or moving cars pass between the light source and the workmen. This can be remedied by cropping the light source below the belting and placing it so that no cars or cranes pass between the sources and the workmen.

Another outstanding fault of industrial lighting is that of improper spacing. Light sources should never be spaced so that a workman will have to move from a brightly lighted area into a comparatively dark area. A workman working in a brightly lighted area, who has to move into a darker area, is open to accident, as his eye becomes accustomed to high intensity illumination and when he moves into a darker area he is practically blinded until his eye can adjust itself to a lower level of illumination. On coming into a comparatively dark room from sunshine out of doors you will find it is usually a few minutes before you can see clearly. When this happens in industrial plants there may be an opportunity for an accident.

A very good rule to follow in spacing of light sources is to never have the distance between light sources greater than the distance between the working plane and the light source. In other words, if the light source is 10 ft. above the working plane, the spacing between these sources should be 10 ft., and with the proper reflectors the beam spread from one reflector will give approximately 50% overlap of the other reflector, which will result in uniform illu- lighting of your plant, you would be able to wipe off the estimated 25% of accidents caused by improper lighting.

Does Good Lighting Pay?

The question may be asked, "Does proper lighting pay from a dollar and cent point of view?" In this connection I would like to read to you an article which recently appeared in the National Electric Light Association bulletin, entitled "Is Lighting Nonsense?"

In the following statement, written by John Magee, president of the Detroit Piston Ring Co., the "non-cents" of poor lighting and "good cents" of good lighting is clearly revealed:

"To determine the exact value of lighting, we made an unusually thorough test extending over a period of 15 months, keeping machinery, number of employes and every other factor as nearly fixed as possible. At the time when our tests were conducted we were running at about 70% capacity, based on the production of 12,000 piston rings per day. As near as could be determined, the average intensity of illumination with the old lighting was 1.2 footcandles.

"We took our department—25 ft. by 100 ft.—and provided it with 35 outlets spaced on 7½ ft. above the floor, and the whole system was so arranged that any size lamp up to 200 watts could be used.

"Lamps with diffusing caps rated at 100 watts were first tried over a period of four months. The average production during that time was a little over 13% better than from the old individual type of lamps. And the average intensity of light for the whole shop was about 6½ footcandles.

"And so it went; 150-watt lamps with standard dome reflectors pulled up production to 88.4%, or an increase of 17.9% over the old installation; 200-watt lamps with dome glass top reflectors showed a 96.3% production, which was actually a 25.8% increase. The intensity averages for these last two tests were 9 footcandles and 15 footcandles respectively.

"We analyzed the results as we went along, but before we were half through with the job it was perfectly obvious that there was going to be a neat little saving here. So were laid aside the figures for an instant and started estimating in another direction.

"Like all companies, we had a certain amount of spoilage, accident hazards, and so forth, which, no doubt, could be laid to inadequate lighting. A few minutes spent in adding and subtracting revealed this fact: The cost of all the spoilage, accident hazards, and so on, which represents wastes, could be offset by 1% increase in production. And the 200-watt installation gave us a 25% increase.

"While the increased cost of the new lighting over the old was 48%, this only represented about a 2% increase measured in terms of the monthly payroll. In other words, the maintaining of a good lighting system is but a small fraction of the general expenses. And because it has such an important effect on production, it is folly to think of curtailing its expense.

"Because of the marked decrease in overhead expense, we could get our costs down to a point where we could sell at a figure which brought an increased volume. And this volume is a factor which still further reduces overhead. Improved lighting was an eye-opener to the many savings that better methods of management can make. And we are becoming increasingly aware of these better methods every day."

A letter cent to the late Judge Gary of the United States Steel Corp. by Secretary of Labor Davis cites the reports of the Depaprtment of Labor showing that in plant groups composed largely of the Steel corporation subsidiaries the accident frequency ratio has dropped from 60.3 per million hours of exposure in 1913 to 10.2 per million hours of exposure in 1924, a reduction of 83%. "What especially pleases me," wrote Secretary Davis to Judge Gary, "is your reported statement that the United States Steel Corp. has found that prevention and safety work really pay from a dollar and cent point of view. You are reported as having stated that the United States Steel Corp. in ten years spent nine and a half million dollars in accident prevention work and that the money saving resulting therefrom has been fourteen and a half million dollars in addition to the fact that 250,000 men have been saved from injury."

Germans Anticipate Building of a New Cement Plant in Peru

(O. C. Townsend, Commercial Attache, Lima, Peru)

THREE GERMAN COMMISSIONERS representing several German financial and industrial corporations arrived in Peru during the middle of May for the purpose of studying the possibility of establishing in Lima with German capital a large financial and industrial organization which would undertake, under contract, the execution of various public works, such as railway lines, roads, paving, etc., and also the construction of buildings and residences of all kinds. With that end in view the first contemplated step is the construction of a modern cement plant, which would supply the portland cement required for the works.

Foreign Abstracts and Patent Review

Determining Size of Grain by Sedimentation—D. Werner and St.-S. Hedstroem describe a new apparatus for recording sedimentation curves. It consists of a mixing room in which the substance is distributed with the medium of sedimentation in each case, of a sedimentation cylinder with protecting armature, discharge valve and measuring tube. The process is based upon the determining of quantity of sedimentation by determining its volume. The results are plotted in distribution curves according to Soen Oden, in that the radius is entered upon the abscissa, which indicates the read radius intervals; and upon these is each time drawn a rectangle, the surface of which represents the content in per cent of the material of each respective fraction. A series of such rectangles gives the distribution of the grains of the materials.—*Technisk Tidskrift,* Stockholm, No. 58 (1928), pp. 17-23.

Concerning Production of Ammonia Sulphate from Gypsum—M. M. Matignon and M. Frejacques studies the influence of various factors upon the reaction: $(NH_4)_2CO_3+CaSO_4=(NH_4)2SO_4+CaCO_3$. Under the most favorable conditions they obtained a 96% extraction inside 2½ hours, but in the factory process 5 to 8 hours were required. The slow reaction process is to be explained by the low solubility of the calcium sulphate and by the sedimentation of $CaCO_3$ over the grains of gypsum. Tests were recently made by Band, and in order to obtain the calcium sulphate suspended, he added a material which does not react with it, namely, clay of the following composition: SiO_2, 72.2%; Al_2O_3, 13.05%; Fe_2O_3, 5.25%; $K_2O{\cdot}Na_2O$, 2.49%; ignition loss, 4.1%. Besides this the clay contained small quantities of CaO, MgO and TiO_2. By this addition cement resulted as a usable byproduct. He worked with an iron plate autoclave, having a forward and backward moving device, and an ammonical solution. The 400 g. (14.1 oz.) of air-dry gypsum which passed a No. 80 (metric) screen, was stirred with 70 g. (2.47 oz.) clay, 330 cu. cm. (20 cu. in.) of a 280 Bé strong ammonia solution and 600 cu. cm. (17 cu. in.) H_2O, with the introduction of carbonic acid. The best extraction was 96.6%, the initial temperature was 70 deg. C. (158 deg. F.) and the final temperature 48 deg. C. (118.4 deg. F.). The reaction was concluded inside 40 minutes. The ammonia can be reclaimed readily. A very uniform filter residue resulted, which when burned made a cement of the following composition: SiO_2, 23.59%; Al_2O_3, 4.28%; Fe_2O_3, 1.85%; CaO, 66.77%; TiO_2, 0.26%; MgO, 1.2%.—*Comptes rendues,* No. 21 (1927), pp. 1138-41.

A New Cement Burning Process in the High Capacity "System Andreas" Shaft Kiln—Dr. K. Biehl describes the new combustion method invented a few years ago by a civil engineer named Andreas, which has since been developed, tested and simplified until it presents today a kiln for the manufacture of portland cement clinker which can truly be called a high capacity shaft kiln, burning all kinds of raw materials, even those that cause difficulties in rotary kilns, thus representing an important step ahead in cement-kiln design. The rapid combustion and sintering, and the intensive rapid cooling characteristic of the Andreas kiln, are effected by introducing the combustion air with a blower at the center of the kiln instead of at the rim as customary, thus assuring better distribution of the air, a more uniform fire, lower coal consumption, a shortened combustion process and in turn a better quality in clinker and cement. Instead of using shaft kilns up to 20 m. (66 ft.) high to attain a high output, kilns 6 to 10 m. (20 to 33 ft.) high are found sufficient, with the Andreas process. Shaft kilns of 2.5 m. (8.2 ft.) inside diameter and 7.5 to 8 m. (24.6 to 26.2 ft.) height above the grate, which previously produced about 40 to 50 ton of clinker daily, are producing more than 100 tons, after having been equipped with the Andreas system. The power requirements of the rebuilt kiln are the same per ton as before rebuilding.

The process has been found applicable not only for burning entirely briquetted and molded material, but also for unbriquetted material, in which case the materials are simply mixed, moistened and fed with a specially designed mixing spiral; an apparent difficulty with the latter is that sometimes an increased volume of water may be necessary, which problem is still being considered although the addition of more water is said to effect a better burn and an easier grinding of the clinker, since water is a heat conductor and by evaporation makes the mixture and the burned clinker more porous. Slides taken from a rotary kiln, an ordinary shaft kiln, and an Andreas system shaft kiln show that the latter produces a clinker which simulates that of the rotary clinker kiln very much in this respect, that it shows a fine-grained and solid structure and large clinkers, which is an indication that in this process, similarly as in the rotary kiln, a sharp burn and rapid cooling are attained.—*Tonindustrie-Zeitung,* No. 50 (1928), pp. 1015-1017.

Studies Concerning the Phenomena of the Setting and Hardening of the Hydraulic Cements—Dr. K. Biehl closes his labors (see *Zement* No. 12 and No. 21) and draws from his investigations the following conclusions: Upon the basis of microscopic observations to determine the influence of solutions of different kinds upon the cement grain, it is shown that the setting of a hydraulic cement starts with a crystallization process, with which appears, closely coupled, a gel formation. A strong and vigorous crystallization formation results in an increased formation of gel. The accelerating or retarding effect of the solution could be observed by an earlier or later starting of crystal and gel formation. It is dependent upon the concentration of the solutions. Under the various concentrations of one and the same solution accelerating as well as retarding influences can appear. If the solutions react with the lime liberated during the setting, crystals of a different kind than in the normal case appear first. The salt solutions show in most cases electrolytic effects upon the deflocculation of gelatinizing of the gel. In the setting process, special importance is to be given to the crystallization process. The appearance of the gel in the setting does not seem to be of decisive importance in all cases. But its presence has great influence in the hardening process, and by all means in the susequent hardening process, due to its solidifying effect, its gradual drying out and the strengthening connected with it. The effect of the gypsum upon the setting period of the portland cement is based upon two different circumstances, upon the change in its solubility products, through the lime which is freed in the setting; and the considerably retarded formation of the typical crystals because of this, and furthermore upon the loosening of the silicate gel. The strength-increasing effect of the gypsum is believed to be traced back to its crystallizing out, which has an additive effect. The above studies represent an attempt to obtain explanations concerning the hardening and setting problems of hydraulic cements in a new way. Even though many details and appearances, which show themselves in hydraulic cement hardening in practice, may not be explained without reserve, the problem can nevertheless not be considered as solved. Even if the one or the other explanation can be considered as fully valid of proof, it is believed that in the chosen path, there can still be brought to light much useable material through further pursuit of the problem. The tests for clarification of the effect of the so-called "exciters" upon the setting and hardening process promises to become more important.—*Zement* No. 24 (1928), pp. 934-937.

Decomposition of Cements. In a special report of a German Chemical Society meeting it is stated by H. Lafuma that chemical reagents may decompose mortar, either by solution of a constituent or by combination with the ingredients. In the case of decomposition by combination of foreign salts with a constituent of the cement, a characteristic "blowing" occurs, as in the case of decomposition by means of calcium sulphate. A combination of the calcium sulphate with the calcium aluminate of the cement takes place, forming the sulphoaluminate of Candlot. The mechanism of this decomposition is roughly analogous to the mechanism of the slaking of lime. When water is added to anhydrous substance (like quicklime) in quantity insufficient for a solution, this reaction is always accompanied by blowing, which destroys the cohesion of the mortar. The same phenomenon occurs with calcium sulphate and cement. If the calcium sulphate reacts with an aluminate in which the alumina has not been completely dissolved, blowing takes place, as in the case of unfused aluminous cement. But if the calcium sulphate combines with the aluminate in soluble form, blowing does not occur, as in the case of fused aluminous cement. This theory can be generalized. Every reaction which takes place between solid salts without previous solution has a deleterious effect upon the strength. Reactions between dissolved salts are without ill effect on the mortar. This theory holds true in the reaction of fat lime on anhydrous calcium aluminate, but does not stand up on the hardening of blast furnace cements. Blast furnace slag seems to harden with fat lime without previous solution.—*Stone Trades Journal*, 1928, 456.

Concerning the Application of Colloids in Preventing Boiler Scale—In connection with an earlier work (*Zeitschrift fuer angewandte Chemie* [1927], vol. 40, pp. 1176 and 1276) this more recent investigation of Dr. C. Sauer is concerned principally with the elimination of calcium sulphate from colloidal water. His researches are of interest to Rock Products readers as throwing some light on the behavior of gypsum under certain conditions. For obtaining comparative data, the solubility relations of pure, artificially prepared $CaSO_4$ in water at higher pressures and temperatures were determined. Furthermore, additions of calcium bicarbonate, magnesium bicarbonate and magnesium sulphate were added to the gypsum solution, in order to determine the influence of these salts, which are present in the natural hard water, upon the excretion of the $CaSO_4$. These tests were repeated with the addition of colloids such as gelatine, gum arabic, agar-agar, carraghen and tannin at 10 atmospheres (147 lb.) gage pressure; the influence of alkali upon the solution of gypsum in the presence of the various colloids was also investigated.

Under high steam pressures the calcium content of the water recedes considerably; thereby the equilibrium is established very rapidly after the test pressure involved has been reached. The hardness remains constant from there on, no matter whether the content of calcium in the solution is increased by the pumping in of additional fresh gypsum solution, or by the evaporation of the solution. The protecting colloids were added to the gypsum solutions in concentrations of 0.1 to 0.4%. A chemical action in the form of a change in the reducing products of these materials with calcium sulphate, as it begins opposite the calcium carbonate, was in no case determinable. The quantity of $CaSO_4$ actually dissolved is the same, at a certain steam pressure, with or without the addition of the protecting colloid. On the other hand, their effect is very strongly colloid-chemical; it showed itself in the tests of colloidal water forced out of the boiler, in which a much greater hardness was found, which became constantly greater with an increasing content in colloid form. Thereby the sum of the colloid and the genuinely dissolved calcium sulphate was determined. The determinations of calcium of the samples filtered through a membrane filter gave, on the other hand the content of actually dissolved $CaSO_4$, which is not influenced by the addition of the protecting colloid.

By the addition of protecting colloids the formation of a solid scale is decreased markedly. The tannin goes the farthest in this respect; but additions of tannin result in a strong muddying of the boiler, and the aciduous reducing products of the tannin effect the iron of the boiler considerably.

Most of the means for the prevention of scale which were investigated, contain besides those mentioned, colloid additions of soda or caustic potash. If to a $CaSO_4$ solution, which contains the above-mentioned protecting colloids, soda in 10% excess is added, figured upon the gypsum content of the solutions, this excess is not sufficient to neutralize the aciduous reducing products, and a partial re-dissolving of the extracted calcium carbonate takes place. Only an excess of about 50% of sodium carbonate is sufficient, in the quantities of colloid employed, to complete the change of the $CaSO_4$ into $CaSO_3$. An exception is the tannin, the strongly aciduous reducing products of which could be neutralized only after an addition of at least 100% excess of soda.—*Zeitschrift fuer angewandte Chemie* No. 23 (1928).

The Characteristics of Magnesite for Refractories—The chemical composition, the porosity, the water absorption capacity, the specific weight and the volume-weight of the various magnesite stones were investigated for refractories. Furthermore the characteristics of each was determined at high temperature under load, the permanent change in length after repeated heating, the transitory heat expansion and the compressive strength in cold and hot condition (1200 deg. C. or 2192 deg. F.).

The result of the tests was the possibility of dividing the magnesite into nine groups. The three first groups comprise stones of low magnesium oxide content and mostly unfavorable of behavior as refractories. Besides a high content of Fe_2O_3 they have larger quantities of flux media, and show small expansion, loose texture, high wear and low compressive strength. The good market products are in the fourth group; besides a high iron content they show at the same time MgO content and low content of other flux media. The stones of this group have a greater density and show higher values in the softening process under loading. Furthermore, they show a high consistency in volume and in compressive strength and also a low degree of wear.

The groups V to IX comprise stones primarily of MgO with SiO_2 admixtures. Their characteristics approach, with an increasing MgO content, more and more the behavior of pure molten magnesia. The density is high. The melting point in the test under loading was at 1790 deg. C. (3254 deg. F.), and the expansion of the high magnesia stones is very considerable.

The tests indicated further that the place of production, the pre-burning, the make-up, the size of grain and also the character of the burning are decisive factors for the practical characteristics in respect to the chemical and mineral composition.

A further division in groups gave the possibility of differentiating according to the Fe_2O_3 content of three groups, which gather similarities as well in respect to the softening behavior under loading, as also in respect to various other characteristics.

The most favorable Fe_2O_3 was determined as being between 5 and 7%, whereby at the same time only small quantities of silicic materials are present and the strongest sintering and greatest mechanical work are applied.

Further determinations concern the fineness of the magnesia, the behavior in expansion and the resistance to changes in temperature.—*Archiv fuer das Eisenhuettenwesen*, I (1927), pp. 439-444.

Lime and Tuberculosis—Prof. Dr. O. Loew reports that it has been determined at various places that inhaled lime dust is of special value for curing of pulmonary tuberculosis. Even tubercular skin diseases are cured after barely a year of work in a lime works. The same observation has been made also in gypsum works. The earlier assumption that in the case of lime kilns the dry hot air effects the healing effect, was not verified; but it may be taken as correct that the inhaled burned lime serves to encapsule the tubercular cultures. Besides this, it may lead possibly to the enrichment of the blood with lime. Everything points to this that the enrichment with lime in the treatment of tuberculosis is the most dominant viewpoint.—*Tonindustrie-Zeitung*, No. 45 (1928), p. 913.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone flux Week ended July 14	Limestone flux Week ended July 21	Sand, stone and gravel Week ended July 14	Sand, stone and gravel Week ended July 21
Eastern	3,547	3,556	17,392	17,599
Allegheny	3,657	3,706	9,716	10,923
Pocahontas	689	650	1,032	1,360
Southern	456	509	11,695	11,592
Northwestern	1,777	1,979	11,803	10,147
Central Western	483	518	14,470	13,902
Southwestern	438	410	7,865	7,781
Total	11,047	11,328	73,973	73,304

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1927 AND 1928

District	Limestone Flux Period to Date 1927 July 23	Limestone Flux Period to Date 1928 July 21	Sand, Gravel and Stone Period to Date 1927 July 23	Sand, Gravel and Stone Period to Date 1928 July 21
Eastern	91,393	76,666	243,121	235,861
Allegheny	99,868	90,711	202,876	173,302
Pocahontas	13,501	12,252	23,656	21,877
Southern	15,863	15,837	335,304	294,451
Northwestern	38,682	34,573	176,178	159,127
Central Western	14,286	11,806	246,295	266,276
Southwestern	8,816	11,917	152,606	163,956
Total	282,409	253,762	1,380,036	1,314,850

COMPARATIVE TOTAL LOADINGS, 1927 AND 1928

	1927	1928
Limestone flux	*282,409*	*253,762*
Sand, stone, gravel	*1,380,036*	*1,314,850*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning August 11:

SOUTHERN FREIGHT ASSOCIATION DOCKET

41211. **Sand and graved,** from Petersburg, Pudpledock and Hopewell, Va., to Antlers, Va. Present rate, 135c per net ton. Proposed rate on sand and gravel, carloads, as described in Item 5, Agent Glenn's I. C. C. A655, from and to points mentioned above, 115c per net ton—same as rate suggested under Submittal No. 41009, from A. C. L. R. R. sand pits in the vicinity of Petersburg, Va.

41223. **Crushed stone,** between Virginia points. It is proposed to amend Supplement 58 to N. S. R. R. Rate Issue No. 59, pages 2 and 3, now reading: "Slag, crushed or rubble, in bulk, carloads, minimum weight as provided in Note 5. In cents per ton 2000 lb." to read: "Stone, crushed, slag, crushed or rubble, in bulk, carloads, minimum weight as provided in Note 5. In cents per ton 2000 lb."

41294. **Limestone,** from Ladds and Portland, Ga., to Brookhaven and Vicksburg, Miss. Combination rates now apply. Proposed rate on **limestone, ground or pulverized,** carloads (See Note 3), from Ladds and Portland, Ga., to Brookhaven and Vicksburg, Miss., 261c per net ton. Proposed rate to Vicksburg, same as from Cartersville, Ga.; to Brookhaven, same as proposed to Vicksburg.

41325. **Sand and gravel,** from Ellerslie and Warmore, Va., to Snowden and Moyock, N. C. Combination rates now apply. Proposed rates on—Sand and gravel, minimum weight 100,000 lb. (when 90% of marked capacity of car is less than 100,000 lb., such 90% of marked capacity will apply as minimum) except when cars are loaded to their visible capacity, actual weight shall govern, from Ellerslie and Warmore, Va.: To Snowden, 158c; to Moyock, 147c per net ton, same as rates in effect from Richmond, Va.

41356. **Marble, granite or stone, viz.: Stone, crushed, paving or macadam and limestone dust,** from New York, N. Y., to Charlotte, N. C. Lowest combination now applies. Proposed rate on marble, granite and stone, viz.: Stone, crushed, paving or macadam and limestone dust, carloads (See Note 3), from New York, N. Y., to Charlotte, N. C., 32½c per 100 lb., same as the current rate to Columbia, S. C.

41375. **Crushed stone,** from Boxley, Va., to Virginia destinations. It is proposed to establish rates on—Stone, crushed or rubble (See Note 2), from Boxley, Va., to points in Virginia located on A. C. L. R. R., C. & O. Ry., N. & W. Ry., S. A. L. Ry., So. Ry. and Vgn. Ry., on basis of the Interstate Commerce Commission Docket 17617 scales.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

15068. **Stone, broken or crushed,** in bulk in open cars, carloads (See Note 2), from East Wallingford, Conn., and Middlefield (Reed's Gap Quarry), Conn., to Chester, Conn., 70c per net ton. (To expire December 31, 1928, unless sooner cancelled, changed or extended.) Reason—To place Chester, Conn., on same rate as a more distant point (Arnold's, Conn.) from Reed's Gap Quarry.

CENTRAL FREIGHT ASSOCIATION DOCKET

19079. To establish on **sand, viz.: Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica,** carloads; **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads, Burnettsville, Ind., to destinations to which rates are published from Lake Ciecott, Ind., same rates as now in effect from Lake Ciecott, Ind., in P. R. R. Tariff I. C. C. F1918. Present rate—Sixth class.

19080. To establish on **crushed stone,** carloads, North Baltimore, Ohio, to Detroit, Mich., via Hamler, Ohio, and D. T. & I. rate of 95c per ton (no switching to be absorbed in excess of $7 per car). Present rate, 114c per ton.

19090. To establish on **sand and gravel,** carloads, Brevoorts, Ind. To stations on the C. & E. I. Ry. in Indiana:

Main Line.	Prop.		Prop.
Decker	90	Knowles	95
Hazelton	90	Cynthiana	95
Patoka	90	Poseyville	95
Princeton	90	Wilson	95
Ft. Branch	95	Wadesville	95
Haubstadt	95	Hepburn	100
Ingle	95	Oliver	100
Mt. Vernon Branch.		Springfield	100
McGary	95	Solitude	100
Owensville	95	Erwin	100
Mounts	95	Mt. Vernon	100

Present rate—Current sixth class.

19102. To establish on **crushed stone,** carloads, Mitchell, Ind., to Cowden and Lakewood, Ill., rate of 113c per net ton. Present rate, 173c per net ton.

19148. To establish on **limestone, agricultural, ground or pulverized,** carloads, minimum weight 50,000 lb., Hillsville, New Castle and Walford, Penn., to Carolina, Idamay and Wyatt, W. Va., rate of 12c. Route—Via P. & L. E. R. R., Connelsville, Penn., and Western Maryland Ry. Present rates—Sixth class, 21½c.

19166. To establish on **stone dust,** in box cars, carloads (See Note 2), Greencastle, Ind., to Indianapolis, Ind., rate of 138c per net ton (60% of sixth class). Present rate, 230c per net ton (sixth class).

19169. To establish on **sand and gravel,** carloads.

To—	From Massillon, O. Prop. rate
Lakeville, Ohio	80
Loudonville, Ohio	85
Perrysville, Ohio	85
	From Buck Hill, O.
Lakeville, Ohio	85
Loudonville, Ohio	85
Perrysville, Ohio	90

Present rates—From Massillon: 90c net ton, Ohio F1445; from Buck Hill: 95c net ton, Ohio F1445.

19178. To establish on **lime, agricultural,** carloads, minimum weight per Official Classification, Genoa, Martin, Marblehead and Sandusky, Ohio, to Minerva and Carrollton, Ohio, 11c. Present rate, 12½c.

19182. To establish on **sand and gravel,** carloads, Brevoorts, Ind., to Indiana points on Penn. R. R. as shown below. Proposed rates (in cents per net ton):

To—	Prop. rate	To—	Prop. rate
Bruceville	82	Marco	97
Bicknell	82	Bee Hunter	97
Edwardsport	87	Bushrod	97
Westphalia	90	Lyons	97
Sandborn	92	Switz City	97

Present rates—Sixth class.

19188. To establish on **sand and gravel,** carloads, Milford, Ind., to stations in Indiana and Michigan, rates as shown below. Proposed rates (in cents per net ton):

To— Chicago Div. Main Line—	Proposed rate
Michigan City, Ind.	112
New Buffalo, Mich.	107
Union Pier, Mich.	107
Lakeside, Mich.	107
Harbert, Mich.	107
Sawyer, Mich.	107
Oak Hall, Mich.	105
Bridgman, Mich.	105
Livingston, Mich.	105
Stevensville, Mich.	105
Glen Lord, Mich.	105
Hill Top, Mich.	100
St. Joseph, Mich.	100
Watervliet, Mich.	105
Riverside, Mich.	105
Vrooman, Mich.	105
Garden City, Mich.	105
Coloma, Mich.	105
Hartford, Mich.	105

Present rates—Sixth class.

19189. To establish on **crushed stone,** carloads, East Liberty, Ohio, to Versailles and Portsmouth, Ohio, rates as shown below. Present and proposed rates (in cents per net ton):

To—	Prop. rate	Pres. rate
Versailles, Ohio	85	Class
Portsmouth, Ohio	125	Class

19191. To establish on **sand and gravel,** carloads, Columbus, Ohio, to Coolville, Ohio, rate of 110c per net ton. Route—Via N. Y. C. R. R., Grosvenor, Ohio, and B. & O. Present rate—115c per net ton.

19195. To establish on **sand, blast, foundry, glass, loam, molding or silica,** carloads, Falconer, N. Y., to points in New York, rates as shown below:

To—	Per net ton
Attica, N. Y.	129
Batavia, N. Y.	130
LeRoy, N. Y.	130
Rochester, N. Y.	150

Present rate—230c per net ton.

TRUNK LINE ASSOCIATION DOCKET

19306. **Crushed stone,** carloads (See Note 2), from White Haven, Penn., to Springville, Penn., $1.05 per ton of 2000 lb. Reason—Proposed rates

are comparable with rates now in force on like commodities for like distances, services and conditions.

19307. **Crushed stone,** carloads (See Note 2), from Steelton, Penn., to Catawissa, $1.25, and Turbottville, Penn., $1.40 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force from and to points in same general territory.

19309. **Crushed stone,** carloads (See Note 2), from Blakeslee, N. Y., to Kirkville, N. Y., 83c per ton of 2000 lb. Reason—Proposed rate is comparable with rates now in force on like commodities for like distances, services and conditions.

19321. (A) **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads. (B) **Sand, blast, engine, foundry, molding, glass, silica, quartz or silex,** carloads (See Note 2), from Lewis, Del., to points on P. R. R., New York Lighterage, N. Y., Brooklyn, N. Y., Reading Stations, York Stations, West Grove, Penn., Hagerstown, Frederick, Rowlandsville, Md., and various. (A) Rates ranging from $1.50 to $2.70. (B) Rates ranging from $1.60 to $2.90 per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

19324. **Stone, crushed,** carloads (See Note 2), from Northampton, Penn., to Lansford, Coaldale and Tamaqua, Penn., 85c per ton of 2000 lb. Reason—Proposed rate is comparable with rate on like commodities from and to points in same general territory.

M974. **Sand and gravel, carloads,** from South Lakewood and Farmingdale, N. J., to Perth Amboy, N. J., 60c per ton of 2000 lb., subject to Rule 77 to be held as maximum to intermediate points.

19331. **Crushed stone,** carloads (See Note 2), from Port Richmond (Philadelphia), Penn., to Richwood, N. J., 90c per ton of 2000 lb. Reason—Proposed rates are fairly comparable with rates on like commodities from and to points in the same general territory.

19335. **Sand,** carloads (See Note 2), from Masonville to South Pemberton, N. J., incl., to Ringoes and Flemington, N. J., $1 per ton of 2000 lb. Reason—Proposed rates are comparable with rate now in force to Metuchen and New Brunswick, N. J.

19336. **Crushed stone,** carloads (See Note 2), from Texas, Md., to Woodberry (Baltimore), Md., 70c per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force to White Hall, Walker, Bentley, Md., etc.

19337. **Foundry sand,** carloads, minimum weight as per O. C., from Wolverton, South Danville, Roaring Creek, Catawissa, Nescopeck, Northumberland, Milton, Nisbet and Williamsport Stations, Penn., to Painted Post, N. Y., 9c per 100 lb. Reason—Proposed rates are comparable with rates now in force to Corning, N. Y.

19341. **Broken stone,** carloads (See Note 2), from St. Peters and Green Lane, Penn., to Longport and Sea Isle City, N. J., $2.05 per ton of 2000 lb. Reason—Proposed rates are comparable with rates to Wildwood-Holly Beach, Cape May, N. J., etc.

19342. **Sand and gravel,** carloads (See Note 2), from Tannery, Penn., to Seek, Coaldale and Tamaqua, Penn., 90% per ton of 2000 lb., to be held as maximum to intermediate points. Reason—Proposed rates are comparable with rates now in force from Portland, Penn.

WESTERN TRUNK LINE DOCKET

6571. **Sand and gravel,** carloads, usual minimum weight, from Hawarden, Iowa, to Aberdeen, S. D. Present, 11½c; proposed 9½c.

4742G. **Dust, limestone,** minimum weight 80,000 lb., from Centerville, Iowa, to Atchison and Leavenworth, Kan. **Present, 17c per 100 lb.;** proposed, $1.70 per net ton.

2051-F-F. **Stone, crushed,** carloads (See Note 3), but not less than 40,000 lb., from Dell Rapids, Sioux Falls, Spencer, S. D., Quartzite and Jasper, Minn., to Superior, Neb. Present—16½c per 100 lb. Proposed—14½c per 100 lb.

SOUTHWESTERN FREIGHT BUREAU DOCKET

1544. **Scrap marble,** from Carthage, Mo., to Grand Island, Neb. To establish rate of $2.25 per ton of 2000 lb. on rock, scrap marble for sugar making purposes, carloads, minimum weight marked capacity of car, but not less than 60,000 lb., from Carthage, Mo., to Grand Island, Neb. A shipper has a factory at Grand Island, Neb., using approximately 5000 tons of this rock annually, and it is understood that these shippers can furnish this amount. The rock usually moves during late June or early July. Shipper has never used Carthage rock at Grand Island, but tests have found it to be suitable and delivered priced on approximately an equal basis with the rock we are now using provided rate of $2.25 per ton can be secured.

15472. **Sand,** from Setag, Texas, to Birmingham, Ala., and Group. To establish rate of $4.80 per ton of 2000 tons on sand, carloads, minimum weight 80,000 lb., or if marked capacity of car used is less than 80,000 lb., then marked capacity will govern, from Setag, Texas, to Birmingham, Ala., and Group. It is contended that the proposed rate is necessary to place Setag, Texas, on a parity with Ottawa, Ill.

ILLINOIS FREIGHT ASSOCIATION DOCKET

4585. **Stone, crushed,** in packages or in bulk, carloads, minimum weight 40,000 lb. From Marshall, Ill.

To (representative points)—	Present	Proposed
Vermillion, Ill.	Class "E"	62
Mattoon, Ill.	Class "E"	76
Nokomis, Ill.	Class "E"	101
Alton, Ill.	Class "E"	126
East St. Louis, Ill.	Class "E"	131
Westville, Ill.	Class "E"	70

3985, Sub. 2A. **Sand and gravel,** usual minimum weight, from Allison Branch, Ill.

To—	Pres. rate	Prop. rate
Bridgeport, Ill.	63	60
Sumner, Ill.	76	60

Kansas Cement Mills Ask New Rates into Texas

THE CEMENT MANUFACTURERS in Kansas on July 27 asked the interstate commerce commission to investigate the freight rates applying to cement moving from Kansas to southwestern Texas.

The Iowa Cement Mills Traffic Association, Ash Grove Lime and Portland Cement Co. of Chanute; Dewey Portland Cement Co., of Oklahoma, and the Monarch Cement Co., Humboldt, joined in a complaint against 34 railroads handling the southwestern Texas cement shipments, charging that present rates from Kansas mills are such as give the Texas mills an unlawful advantage. The petition asks that hearings on the complaint be held in Kansas City.—*Topeka Capital.*

New Scale Prescribed for Cement in South and Southwest

THE commission, by division 1, in a report written by Commissioner Eastman, opinion No. 13580, 144 I. C. C. 585-602, has found unreasonable and unduly prejudicial the rates on cement from points in the Kansas gas belt, Ada, Okla., Eagle Ford, Harrys and Houston (Manchester), Texas, Hannibal (Ilasco), Mo., Birmingham, North Birmingham, Spocari, Leeds and Ragland, Ala., Portland, Ga., Chattanooga, Nashville and Richard City, Tenn., Marquette, Mo., and Kosmosdale, Ky., to points in Louisiana, Arkansas, Mississippi and Tennessee. It has prescribed a scale to be used in the making of new rates not later than October 30.

Also intrastate rates and charges on cement from New Orleans, La., to points in Louisiana have been found unduly preferential of such points and shippers therefrom and unduly prejudicial to interstate shippers. The same scale is to be used in removing that undue prejudice.

The commission has also accorded relief to the circuitous lines by an order authorizing the carriers to publish, in lieu of a specific routing, a general rule showing only rates and maximum distances. The commission considered also a number of other complaints from manufacturers of the territory alleging undue preference to competitors.

In reaching the decision, the commission considered the present inequalities in rates on cement in the south and southwest, together with the relationship of the producing area, to the non-producing area. Also the importation of cement was taken into account.

The scale shown in the table below was prescribed by the commission to place the rates in this territory on an equitable basis.

SCALE OF NEWLY PRESCRIBED RATES FOR CEMENT IN SOUTH AND SOUTHWEST

Distance Scale Prescribed in Cents per 100 Lb.
(For application in connection with a carload minimum weight of 50,000 lb., subject to marked capacity of car, but not less than 40,000 lb.)

Distance		Rate, Cents
5 miles and less		7.5
10 miles and over	5	8
15 miles and over	10	8
20 miles and over	15	8.5
25 miles and over	20	8.5
30 miles and over	25	8.5
35 miles and over	30	9
40 miles and over	35	9.5
45 miles and over	40	9.5
50 miles and over	45	9.5
55 miles and over	50	10
60 miles and over	55	10
65 miles and over	60	10.5
70 miles and over	65	10.5
75 miles and over	70	10.5
80 miles and over	75	11
85 miles and over	80	11.5
90 miles and over	85	11.5
95 miles and over	90	11.5
100 miles and over	95	11.5
110 miles and over	100	11.5
120 miles and over	110	12
130 miles and over	120	12.5
140 miles and over	130	13
150 miles and over	140	13
160 miles and over	150	13.5
170 miles and over	160	13.5
180 miles and over	170	14
190 miles and over	180	15
200 miles and over	190	15
210 miles and over	200	15
220 miles and over	210	15.5
230 miles and over	220	16
240 miles and over	230	16
250 miles and over	240	16
260 miles and over	250	16.5
270 miles and over	260	16.5
280 miles and over	270	17
290 miles and over	280	17
300 miles and over	290	17.5
310 miles and over	300	17.5
320 miles and over	310	18
330 miles and over	320	18
340 miles and over	330	18.5
350 miles and over	340	18.5
360 miles and over	350	19
370 miles and over	360	19.5
380 miles and over	370	20
390 miles and over	380	20
400 miles and over	390	20.5
410 miles and over	400	20.5
420 miles and over	410	20.5
430 miles and over	420	20.5
440 miles and over	430	21
450 miles and over	440	21
460 miles and over	450	21.5
470 miles and over	460	21.5
480 miles and over	470	22
490 miles and over	480	22
500 miles and over	490	22.5
520 miles and over	500	23
540 miles and over	520	23.5
560 miles and over	540	24
580 miles and over	560	24.5
600 miles and over	580	25
620 miles and over	600	25
640 miles and over	620	26
660 miles and over	640	26.5
680 miles and over	660	27
700 miles and over	680	27.5
720 miles and over	700	28
740 miles and over	720	28.5
760 miles and over	740	29.5
780 miles and over	760	29.5
800 miles and over	780	30
820 miles and over	800	30.5
840 miles and over	820	31
860 miles and over	840	31.5
880 miles and over	860	32
900 miles and over	880	32.5
920 miles and over	900	33
940 miles and over	920	34
960 miles and over	940	34
980 miles and over	960	34
1000 miles and over	980	35
1020 miles and over	1000	35
1040 miles and over	1020	36
1060 miles and over	1040	36.5
1080 miles and over	1060	37
1100 miles and over	1080	38
1120 miles and over	1100	38
1140 miles and over	1120	38.5
1160 miles and over	1140	39
1180 miles and over	1160	39
1200 miles and over	1180	40

Sand-Lime Brick Production and Shipments in July

THE following data are compiled from reports received direct from 24 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is one more than those furnishing statistics for the June estimate published in the July 21 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having about one-half the production capacity in the United States and Canada.

Production is considerably lower than in June, with five plants reporting no production whatever. Total shipments also show quite a decline from the June figures, while stocks on hand and unfilled orders remain practically the same as the previous month. There is very little change in the prices for brick over the entire country.

The following are average prices quoted for sand-lime brick in July:

Average Prices for July

Shipping Point	Plant Price	Delivered
Albany, Ga.	$10.00	$11.50
Boston, Mass.	.....	16.00
Buffalo, N. Y.	12.25	16.50
Dayton, Ohio	12.50	15.50
Detroit, Mich. (2 plants)	.....	16.00
Detroit, Mich. (less 5%)	.....	15.50@16.00
Detroit, Mich.	13.00	15.50@16.00
Grand Rapids, Mich.	12.50	.....
Hartford, Conn.	14.00	19.00
Jackson, Mich.	12.25	.....
Madison, Wis.	12.00@12.50	13.00@14.00
Menominee, Mich.	11.00	14.50
Milwaukee, Wis.	10.50	13.00
Minneapolis, Minn.	10.00	12.75
Mishawaka, Ind.	11.00	.....
New Orleans, La.	.....	.....
Pontiac, Mich.	12.00	14.00
Rochester, N. Y.	.....	19.75
Saginaw, Mich.	12.00	.....
Sebewaing, Mich.	.....	.....
Syracuse, N. Y.	18.00	20.00
Toronto, Canada	12.50	15.00
Winchester, Mass.	.....	16.00

The following statistics are compiled from data received direct from 24 producers of sand-lime brick in the United States and Canada:

Statistics for June and July, 1928

	*June	†July
Production	19,133,300	18,071,800
Shipments (rail)	5,120,300	6,054,700
Shipments (truck)	14,437,000	11,771,600
Stocks	11,656,000	12,591,300
Unfilled orders	11,718,000	11,762,000

*23 plants reporting.
†Incomplete, two plants not reporting stocks and nine plants not reporting unfilled orders.

Notes from Producers

Jackson Brick Co., Jackson, Mich., are to supply brick for the new Durant Motor Co. building being erected at Lansing, Mich.

North Indiana Brick Co., Mishawaka, Ind., has now completed the transfer of its facilities from its former plant at Michigan City, Ind., to its new plant at Mishawaka and is now operating the new plant at normal output.

Here is a new use for rock products—crushed-stone floor coverings for window displays

Hey! What's This Doing in Rock Products?

LOOK closely at the picture herewith, Mr. Crushed Stone, Sand or Gravel Man, and you will see something besides some ladies' wear. The floor of the window is covered with white stone chips. The mats or rugs are green. It makes a very pretty window display—that is, the mats and stone chips, not the $10 dresses. We saw it in Rochester, N. Y.

Don't know where the stone chips came from, or whose idea it was. We offer the picture and the note as a novel use for crushed stone—nice clean gravel or white sand would serve equally well.

This is only one window of a whole group thus trimmed. Must have required about a half a ton of stone. We'll let you figure the number of show windows in the United States and the possible market for "window crushed stone."

Addendum

IN the article on the sand-lime brick plant of the Atlas White Brick Co. at Berlin, N. J., which appeared in the July 21 issue of ROCK PRODUCTS, it was stated that the capacity of the Jackson and Church press therein described was 20,000 brick per day. Our attention is called to the fact that the capacity of this press, as given by the Jackson and Church company, is 3000 brick per hour, or considerably more than the capacity stated in the article. It is also stated that this is a conservative estimate, since under favorable conditions, this may reach 3300 to 3400 brick per hour. In the article in question the output of the press was given as its capacity, whereas it was not actually running at capacity.

Ohio Finishing Lime Association Opens Atlanta Office

THE Finishing Lime Association of Ohio, Toledo, Ohio, has opened its southern district office at 509 Bona Allen building, Atlanta, Ga. W. S. Hay is district engineer in charge.

This association is composed of a number of lime plaster manufacturers and was formed for the purpose of promoting the sale of lime plaster. Growth and development in building in this territory brought about the establishment of the southern office and Atlanta was chosen on account of its strategic position for serving the south.

The Atlanta office will have supervision over the states of North Carolina, South Carolina, Georgia, Florida, Alabama and Mississippi.—*Atlanta* (Ga.) *Constitution.*

"Footprints in the Sands of Time"

FOOTPRINTS in sandstone which might have been made by a child and an adult on the shores of Lake Erie thousands of years ago, have been uncovered by workmen in the quarries of the Cleveland Stone Co., located near Amherst, Ohio.

A score or more geologists have visited the quarry since the discovery.

The prints were probably made in the soft sand at a time when the lake regions were salt sea marsh.

Workmen at the quarry also unearthed recently a section of a tree at the depth of 102 ft. It was in the last stages of turning to coal.

The rocks in which the two footprints appear were put on display in Amherst on August 8, 9 and 10, and then presented to the officials of the company by the workmen. —*Cleveland* (Ohio) *Plain Dealer.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Merchandising Has Brought Success to This Plant

Chicago Haydite Building Units Adopts Aggressive Sales Policy

By M. R. Bowers
Promotion Engineer, Portland Cement Association

A FINE EXAMPLE of what can be accomplished in the concrete products industry by applying the principles of modern merchandising is shown in the development of Chicago Haydite Buildings Units, Inc., of Blue Island, Ill. Organized in March of this year by a group of men with vision and foresight, who have been schooled in the products business for over 20 years, the company was incorporated with $40,000 invested capital. The buildings and site of the old Continental Cement Tile Roofing Co. were purchased and work was started immediately on rearranging the plant layout, installing new equipment, storage bins, hoppers and other features that would make the plant modern and efficient.

The owners of the new company decided at the start to manufacture and sell two distinct types of products, namely, "Haydite" block and tile, and manhole and catch basin block. They took over the manufacturing rights on Haydite building units for Blue Island and surrounding territory and arranged to receive the Haydite aggregate from the Western Brick Co. of Danville, Ill., over a spur track running to the plant. Limestone screenings, the aggregate used for making the manhole and catch basin block, are purchased from the Thornton Co. and shipped directly to the plant by railroad.

The aggregate is dumped directly from the cars into a track hopper and elevated to three overhead storage bins 16x16x30 ft., one for coarse Haydite, another for fine, and the third for limestone screenings. From the bins the aggregate falls by gravity into overhead batchers which empty directly into 21-ft. Ideal batch mixers for the two block machines and a 14-ft. Ideal mixer for the brick machine. The bottom-dump mixers discharge into agitating feeders back of the machines. The plant is equipped with one Anchor brick machine, one Anchor stripper and one Universal manhole and catch basin block machine. The automatic Anchor stripper will produce 1600 Haydite block per 8-hour day and the Universal machine 1500 manhole block.

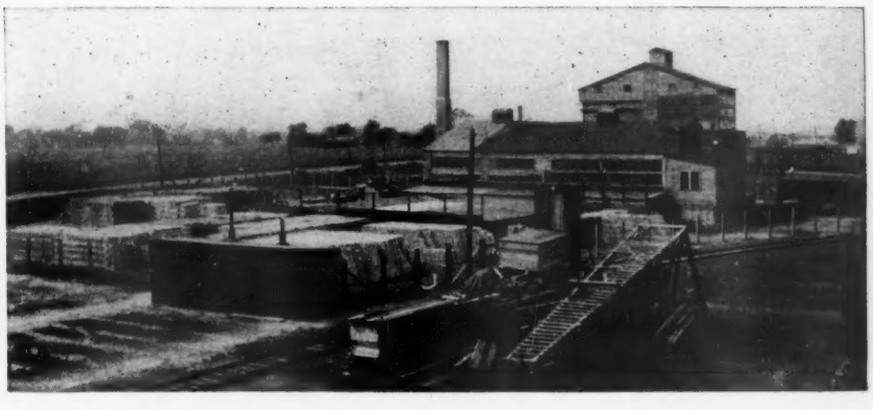
Time-Saving Methods

Each block machine is equipped with a pivoting rock which swings under the unit. When the push rods go down the unit rests on the rack and can be swung free from the machine by the operator to the off-bearer, who then removes it to wooden racks. This device is good both from a safety viewpoint and as a time saver. The off-bearer does not have to reach under the tamp feet to remove the unit and thus does not interfere with the work of the machine operator.

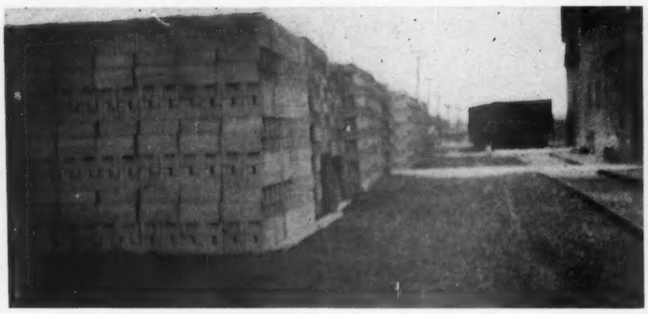
Two Barrett lift trucks are used to carry the loaded rocks to the six curing chambers where the units are steam-cured for 24 to 48 hours. These chambers have ceilings of precast concrete slabs and walls of concrete block. The concrete floors slope from the machines down through the curing rooms to the storage yard. Manhole block are stacked 10 high and Haydite units 12 high in the yard.

The gravity arrangement of the plant layout saves time and money for the owners, since it allows the raw material to enter at one end and the finished product to go out at the other with a minimum amount of work. Recognizing that production costs must be kept down if the plant is to be successful, every effort has been made to cut the cost per unit to the absolute minimum without overloading the plant with fixed capital.

The success of Chicago Haydite Building Units, Inc., has been largely due to the aggressive merchandising practices which this company undertook immediately upon becoming organized. It is due also to the fact that a production cost system, covering employes, material and equipment is kept every day of the year. The owners and offi-



The plant and storage yard of the Chicago Haydite Building Units, Inc., at Blue Island, Ill.



A portion of the storage yard and the track spur over which the aggregates are received

Block for 48-in. manholes stored ready for shipping

cials of the plant know at all times just what each man and each machine is costing the company, and with such a system in practice it is not at all difficult to reach a decision as to whether a man or a machine is an asset or a liability. Overhead expenses are carefully figured out and every effort is made to see that there are no "profit leaks" in any part of the business.

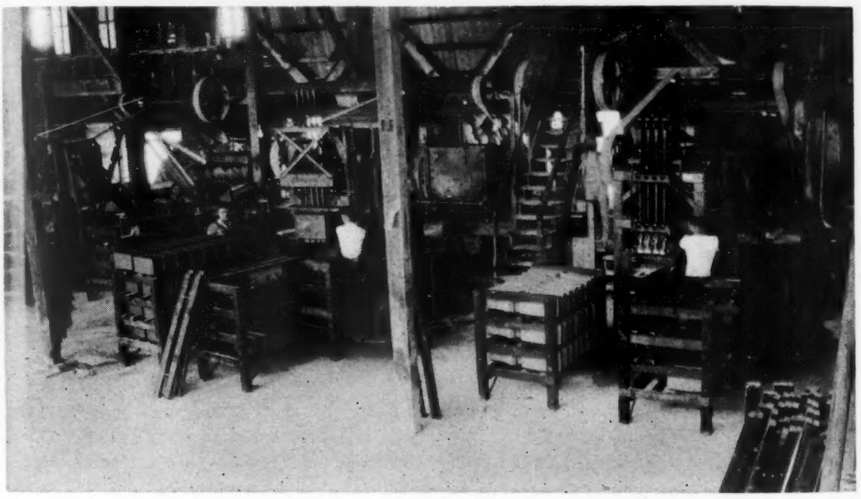
Merchandising the Product

Under the merchandising activities of the company come *selling* and *advertising*. Two months before the plant was producing a single unit, two salesmen were hired and these two men devoted practically all of their time to advance promotion with architects, builders, contractors and building officials. In this way valuable contacts were made which could be used later to good advantage in an intensive selling campaign.

Since the plant has been in operation, in the brief-case of each salesman are testimonial letters from architects, contractors and builders on the merits of the building units being manufactured by the company. A catalog containing test data on strength, fire safety, sound-proofness, damp-proofness, insulation and nailability of the units. Construction details, concrete first floor construction, testimonials on local jobs, comparative cost data on different types of construction, price lists, plan books and photographs are also included.

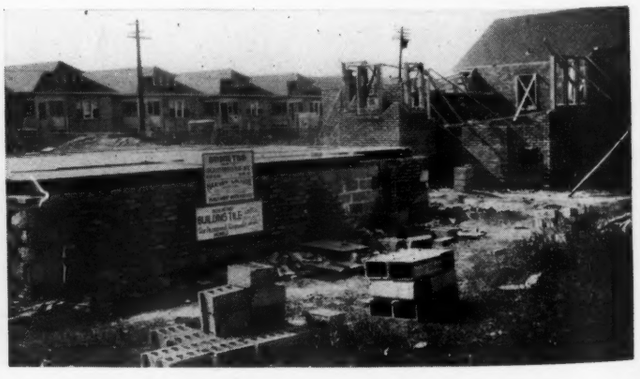
One of the first tasks of the sales manager was that of working out a tentative merchandising program for the year. This included advertising in its several forms, such as billboard, direct mail and newspaper. A large illuminated sign was placed at the plant and a number of highway signs were erected at strategic points. Signs were made for use on jobs where the company's products are being used. A booklet distribution was made to architects, contractors and prospects, and personal, direct mail letters from the sales manager were mailed to a select list of prospects. A schedule of local newspaper advertising was planned in which cuts of various jobs would be run. This advertising program is a real aid in breaking down sales resistance for the salesman when he makes his personal call on a prospect.

The men back of this company possessed a knowledge and foresight that enabled them to visualize the possibilities of a great future market in the region where they planned to establish their new plant. They realized at the start that plenty of competition would be offered by old-line competitors of 15 and 25 years' standing and other products plants already established. But they knew that aggressive selling and advertising would develop this market, and, possessing the cour-



Interior of the plant, showing the two machines in operation

Stock pile of concrete manhole block in which limestone screenings were used



Units of Haydite were placed in this wall for the back-up

age of their own convictions, they established plant, hired salesmen, and today they are well on the road to success.

A feature that has aided greatly in bringing success to Chicago Haydite Building Units, Inc., has been its policy of concentrating all of its energies upon manufacturing two lines of building units, namely, the Haydite building units and manhole and catch basin block. The latter product, in which limestone screenings are used, has found a ready market and this has enabled the company to concentrate its sales efforts on Haydite building units in a field where competition is unusually keen.

A Constructive Program for Products Manufacturers!

DUE TO CHANGES in the association personnel, it may be well at this time to give you a bird's-eye view of the activities which have been carried on during the past five months and which we will continue in the future. To carry on this work successfully requires the co-operation of every member.

Below is our program for 1928:

1. *PRODUCTION OF QUALITY PRODUCTS:* To improve and maintain the quality of concrete products by a practical application of laboratory methods to plant operation. Not only is it intended to increase quality, but in so doing, reduce production cost.

2. *MERCANDISING AND ADVERTISING:* To assist in every way practical a greater distribution of our product by the application of modern methods of merchandising and advertising.

3. *LAW ENFORCEMENT:* To work with proper officials, both state and local, to see that proper legislation is enacted and enforced making possible the use of only quality products in masonry construction.

4. *EDUCATION:* To educate not only the building public, but our own members and employes, in the use of our product and in various steps we have taken to control its quality.

5. *FREIGHT CHARGES:* To secure just and equitable freight rates that will allow fair competition with competitive materials and allow a greater expansion of our present markets.

6. *PUBLICITY:* To secure, wherever possible, proper publicity on the work of our association and its members through national and local publications.

7. *HOME CONSTRUCTION:* To, wherever possible, put our product in buildings "above grade," particularly in the line of home construction.

8. *LARGE BUILDING CONSTRUCTION:* To work with architects, contractors and builders to include concrete products in specifications for factories, warehouses and public buildings.

9. *INSURANCE RATES:* To work with fire insurance companies and actuarial bureaus, both through local and state agents, to secure insurance rates on concrete masonry buildings in accord with the rating accorded this type of construction by the Underwriters' Laboratories.

—*L. E. GRUBE,* president, Wisconsin Concrete Products Association.

Aerocrete Products to Build Plant

A NEW concrete products firm, the Aerocrete Products Co., has recently been formed at Menanda, N. Y., and has acquired a tract of land near the Delaware and Hudson shops on which a large plant is to be erected. Work on the foundations has already been started, according to the report. The company will manufacture lightweight building units, especially adaptable for insulating walls against heat and sound, in which crushed cinders will be used. The new plant is between Albany and Troy.

Frank N. Williams, former state engineer, is president of the company, and Russell S. Greenman, associated with the state engineer's office for a long period, is first vice-president. Benjamin P. Wheat, an attorney, is second vice-president, and Edgar Miller is secretary and treasurer.

Colorado Cities Using Gold Ore for Paving

CRUSHED ROCK from the Vindicator mine dumps in the Cripple Creek, Colo., district—which assays about $2 a ton in gold—is the basis for the hard surfacing of most of Colorado's paving projects in recent years, and a large industry has sprung up out of this side line of the Midland Terminal railroad. In addition the Midland is providing railroads, notably the Rock Island, with great quantities of ballast material for track operations.

The Vindicator crushing plant is supplying on the average of 10,000 tons a month of this crushed rock, which is the ore, crushed, screened and sized at the Vindicator and shipped in cars direct from the spur there. Streets of Colorado Springs, McCook, Neb., and state paving between Denver and Colorado Springs, the new Pueblo road extensions, the Trinidad-Aguilar, Greeley-Fort Morgan and Longmont-Berthoud stretches of state paving all used this rock.—*Colorado Springs* (Colo.) *Telegram.*

Modernize Wyoming Mill

PLANS ALREADY are under way to completely modernize the former Overland plaster mill here, according to an announcement from the United States Gypsum Co., which recently purchased the mill. Not only will the mill equipment be revamped to make possible the manufacture of gypsum plaster in the most modern manner, but the appearance of the mill structure and site will be improved.—*Casper* (Wyo.) *Tribune.*

Wisconsin Products Association Sends Out Letters and Booklets

THE Wisconsin Concrete Products Association continues to be one of the livest groups in the industry today. The circular letters sent out by Jack Franklin, the secretary, are snappy and to the point, and recently an innovation has been added in the form of inclosures of booklets on various cement topics. The latest the association has sent out is a booklet gotten out by the Portland Cement Association, Chicago, on "Concrete Improvements Around the Home," which contains many ideas for the concrete products manufacturer and for his contractor friends. This little book is particularly valuable in giving manufacturers new ideas and showing new uses for concrete units which can be passed on to customers, thus creating new markets and increased sales. Another booklet recently sent out with the circular letters was "Seeing Concrete America," which was intended more as propaganda for the use of concrete in general than for any direct application to the making of concrete building units. The connection, of course, is that a customer convinced of the value of concrete as a permanent building material, will more easily be convinced that units made of concrete are also satisfactory in building.

Tallest Concrete Chimney in Chicago District

ERECTION of a monolithic concrete chimney, 301 ft. 6 in. high, the tallest in the Chicago industrial district, has just been completed at the Buffington, Ind., plant of the Universal Portland Cement Co. This chimney will eliminate a battery of small stacks now in use on the burner building of one of the mills at the plant. Powerful floodlights playing on the chimney will make it a landmark for night flyers and it is being listed as such with the Department of Commerce.

The chimney is built in connection with waste-heat boilers and the most improved type of graded resistance Cottrell precipitator, which will eliminate a high percentage of dust from gases before they pass to the chimney.

The chimney is 26½ ft. in diameter at the bottom and 17 ft. at the top. The walls are 18 in. thick at the bottom and 6 in. at the top, while the foundation is 8 ft. thick at the center and 3 ft. thick at the edges. A fully guarded steel ladder has been constructed on the outside of the chimney in 30-ft. sections, allowing resting places en route for persons climbing to the top.

A single steel form, 7½ ft. high, was used in building the chimney and a 7½-ft. section of concrete was placed every day. The chimney was designed by the engineering department of the Universal and the Rust Engineering Co., Pittsburgh, Penn., was the contractor.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Frederick, Md.	.50@ .75	1.35@1.45	1.15@1.25	1.10@1.20	1.05@1.15	1.05@1.10
Ft. Spring, W. Va.	.40	1.35	1.30	1.25	1.15	1.05
Munns, N. Y.	.75	1.10	1.10	1.00	1.00	.....
Prospect, N. Y.	1.00	1.40	1.25	1.25	1.25	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.75	1.35	1.15	.95	.85	1.35
Walford, Penn.	.....	.....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.....	.....	.....	.....	.50	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Columbia and Krause, Ill.	1.05@1.40	.95@1.50	1.15@1.50	1.05@1.50	1.05@1.50	.....
Cypress, Ill.	1.00@1.25	1.00@1.25	1.20@1.25	1.20@1.25	1.20@1.25	1.35
Davenport, Iowa	1.00	1.50	1.50	1.30	1.30	1.40
Dubuque, Iowa	.85	1.00	1.25	1.25	1.25	.....
East St. Louis, Ill.	1.05@1.40	.95@1.50	1.15@1.50	1.05@1.50	1.05@1.50	.....
Greencastle, Ind.	1.25	1.05	1.05	1.05	.95	.95
Lannon, Wis.	1.00	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Northern Ohio Points	.85@1.15	1.25	1.15	1.15	1.15	1.15
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	.....	1.20	1.10	1.00	.....
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada (m)	2.50	3.00	3.00	2.85	2.85	2.85
Valmeyer, Ill. (fluxing limestone)	.90@1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.....	1.10	1.10	1.10	1.10	.90
Winona, Minn.	1.00	1.20	1.30	1.40	1.40	1.40
Wisconsin Points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Cartersville, Ga.	1.00	1.65	1.65	1.45	1.15	.....
Chico, Texas	1.00	1.30	1.25	1.20	1.10	1.05
Cutler, Fla.	.40r@ .75r	.....	.....	1.75r	.....	1.10r
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Graystone, Ala.	Crusher run, screened, $1 per ton					
Kendrick and Santos, Fla.	3½ in. and less, $1 per ton					
Olive Hill, Ky.	.....	1.00	1.00	1.00	1.00	1.00
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.00	.....
Rock Hill, St. Louis, Mo.	1.00	1.25	1.00@1.25	.90@1.25	.90@1.25	.90@1.25
Sugar Creek, Mo.	.75	1.00	1.20	1.20	1.20	1.20

(r) Cubic yard.

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.65	1.35	1.25	.....
New Britain, Plainville, Rocky Hill, Wallingford, Meridan, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.40@1.45	2.10	1.90	1.40@1.50	1.40@1.50	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Spring Valley, Calif.	.50@ .75	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25
Springfield, N. J.	1.45	2.10	2.00	1.60	1.60	.....
Toronto, Canada (m)	.....	5.80	4.05	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.—Granite	.....	.....	1.80	1.80	1.65	.....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00	.....	2.35	.....	.....	.....
Lithonia, Ga.—Granite	.75a	2.00b	2.00	1.60	1.40	1.35
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.	.40	.....	1.35	1.30	1.25	1.25

(a) Sand. (b) to ¾ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¼ in., 1.35. High calcite fluxing stone, 1.40. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (m) Plus .25 per ton for winter delivery. (n) Crusher run for ballast, .85. (p) Carload prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yd.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh	6.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh	5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh	1.50
Pulverized, per ton	2.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Cypress, Ill.—Analysis, 88% $CaCO_3$; 10% $MgCO_3$; 50-90% thru 4 mesh	1.25
50-90% thru 100 mesh	1.35
Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk	3.50
Paper bags	4.75
100 lb. cloth bags	5.25
(All prices less .25 cash 15 days)	
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton	6.00
90% thru 20 mesh, bulk, per ton	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags	3.95
Bulk	2.70
Jamesville, N. Y.—Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags	4.25
Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 100 mesh, 3.50; 50% thru 100 mesh, 2.50; 90% thru 30 mesh	2.00
Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk	2.70
Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk	1.75
Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk	2.25
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis 99.05% $CaCO_3$; 90% thru 50 mesh; bulk, 4.00; paper bags	5.00
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 101.12%; 99% thru 10, 60% thru 50; 45% thru 100	2.50
100% thru 10, 90% thru 50, 70% thru 100; bags, 5.00; bulk	3.50
100% thru 4, 30% thru 100, bulk	1.50
Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%, $MgCO_3$; 95% thru 10 mesh	1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — 50% thru 100 mesh	1.50
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton	1.25
90% thru 4 mesh, per ton	1.10
Dubuque, Iowa—50% thru 4 mesh	.85
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Spring, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.00
Kansas City, Mo. — 50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Logansport, Ind.—85% thru 10 mesh, 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags	5.00
Stone City, Iowa — Analysis, 98% $CaCO_3$; 90% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.05
Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.10@1.70

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks	6.00
Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill. — Analysis, 52% $CaCO_3$; 46% $MgCO_3$; 90% thru 100 mesh; paper bags (bags extra)	3.50
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@ 3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J.	*1.75@ 2.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Klondike, Mo.	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.30@ .35
Ohlton, Ohio	2.50@ 3.00
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
Rockwood, Mich.	2.25@ 3.00
San Francisco, Calif.	4.00@ 5.00
Silica and Mendota, Va.	2.00
St. Louis, Mo.	2.00
Utica and Ottawa, Ill.	.75@ 1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.50
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	
Estill Springs and Sewanee, Tenn.	1.35@1.50	1.35@1.50
Franklin, Penn.		1.75
Massillon, Ohio		2.25
Michigan City, Ind.		.30
Montoursville, Penn.		1.25
Ohlton, Ohio	2.00	2.00
Ottawa, Ill.	3.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50
Warwick, Ohio		2.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N.J.		.55	1.10	1.25	1.40	
Attica and Franklinville, N. Y.	.65	.65	.65	.65	.65	.65
Boston, Mass.‡	1.40	1.40	1.40		2.25	2.25
Buffalo, N. Y.	1.10	.95	1.05	1.05	1.05	1.05
Erie, Penn.	.60	.80			1.40	
Leeds Junction, Me.	1.00	1.00	2.50		2.25	
Machias Jct., N. Y.	.85	.75	.75		.75	.75
Montoursville, Penn.	1.00	.75	.75	.60	.60	.60
Northern New Jersey	.60	.60		1.25	1.25	
Somerset, Penn.		2.00				
Troy, N. Y.	.50@ .75*	.50@ .75*	.80@1.00*	.80@1.00*		.80@1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75		1.75
Washington, D. C.	.55	.55	1.30	1.30	1.00	1.00
CENTRAL:						
Attica, Ind.			All sizes .75@.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.50	.35	.20	.50	.60	.60
Barton, Wis.		.40	.60	.65	.65	.65
Chicago, Ill.	.50	.50	.60	.60	.60	.60
Columbus, Ohio¶	.65	.65	.65	.65		
Des Moines, Iowa		.40	1.50	1.50	1.50	1.50
Eau Claire, Chippewa Falls, Wis.		.40	.55@ .75	.85	.85	
Elkhart Lake, Wis.	.60	.30	.50	.56	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00		1.00	
Hersey, Mich.		.50		.60		.70
Humboldt, Iowa	.35	.35	1.35	1.35	1.35	1.35
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Mankato, Minn.		.45g		.60@1.25h	.70@1.25	1.25e
Mason City, Iowa		.50	.85	1.30	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.15@ .25	.15@ .25	.75@1.00	.75@1.00	1.00@1.25	1.00@1.25
St. Louis, Mo.	1.15e	1.45f	1.45a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.85	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.10
SOUTHERN:						
Brewster, Fla.	.50	.50	3.00	3.00		
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.		.45				
Fort Worth, Texas		.75@1.25	1.00@1.10	1.00@1.25	1.00@1.35	1.00@1.35
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.	.65@ .90	.65@ .90	2.25@2.50	2.25@2.50	2.25@2.50	2.25@2.50
New Martinsville, W. Va.	1.10	1.00		1.30	1.10	.90
Roseland, La.	.35	.15	.85	.85	.75	.75
WESTERN:						
Kansas City, Mo.	.70	.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Otay, Calif.		.35@ .50	.50@ .60	.50@ .60	.50@ .60	.50@ .60
Phoenix, Ariz. (k)	1.25*	1.15*	1.50*	1.25*	1.15*	1.10*
Pueblo, Colo.	.80	.60		1.20		1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.	.75*		1.30	1.10	1.00	1.00
Des Moines, Iowa				.60		
Dresden, Ohio				.70	.65	
Eau Claire, Chippewa Fls., Wis					.65	
Fort Worth, Texas						.55@ .80
Gainesville, Texas						.55
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		.50
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35					
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Somerset, Penn.		1.85@2.00		1.50@1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	.60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅜-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in. to ¼-in. (j) Lake sand, 1.75, delivered. (k) 60-70% crushed boulders.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.00	1.00@2.25	2.00	2.25@4.00	.....
Beach City, Ohio	1.50@2.00	1.75@2.00	.....	1.50	1.50@1.75	.....	1.50
Dresden, Ohio	1.25@1.50	1.25@1.50	1.50@1.75	1.00@1.25	.....	.....	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	3.00	.....
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25	.....	.....	1.25	.....	1.35@1.50	.....
Franklin, Penn.	1.75	1.75	.....	1.75	.....	.....	.....
Kasota, Minn.	.....	.....	.....	.....	.....	.....	1.00
Kerrs, Ohio	1.10@1.50	1.25@2.00	2.00	.....	.....	2.75@3.00	.....
Massillon, Ohio	2.25	2.25	.....	2.50	2.50	.....	.....
Michigan City, Ind.	.....	.....	.....	.30@ .35	.....	.....	.....
Montoursville, Penn.	.....	.....	.....	1.50	.....	.....	.....
New Lexington, O.	2.00	1.25	.....	.....	.....	.....	.....
Ohlton, Ohio	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Ottawa, Ill.	1.00	1.25	1.50	1.75	1.25	3.50	2.00
Red Wing, Minn.(d)	.....	.....	.....	.....	1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	.....
Silica, Mendota, Va.	Potters flint, 8.00@10.00g						
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Ill.	.60	.70	.....	.75	1.00	.....	.....
Warwick, Ohio	1.50*@2.00h	2.00h	.....	1.50*@2.00h	.....	.....	.....
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00	.....	.....

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried. 2.50. (d) Filter sand, 3.00. (e) Filter sand, $3.00@4.25. (f) Crude and dry. (g) Also 12.00. (h) Washed, 1.75.

Crushed Slag

City or shipping point EASTERN:	Roofing	¼ in. down	⅜ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.25	.....	1.00	.....	.....	.....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	.....
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	.....
Toledo, Ohio	1.50	1.35	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	.....	1.45*	.....	1.45*	1.45*	1.45*	.....
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.90
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1¼ in. to ¼ in., $1.05; ⅝ in. to 10 mesh, $1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

EASTERN:	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
Berkeley, R. I.	.....	.....	12.00	.....	.....	.....	.....	2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.	.....	.....	.....	.....	.....	.....	5.00	.....
West Stockbridge, Mass.	12.00	10.00	5.60	.....	.....	.....	.....	2.00[13]
Williamsport, Penn.	10.00@11.00	8.50@9.00	8.50@9.00	.....	7.00	9.00	5.00	.....
York, Penn., & Oranda, Va.	11.50[7]	8.50@9.50[7]	8.50@9.50[7]	8.50@10.50[7]	8.00	9.25	7.00	1.40[5]
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	7.50	.....	.....	1.35
Carey, Ohio	11.50	7.50	7.50	.....	8.00	.....	8.00	1.50
Cold Springs, Ohio	.....	8.00	8.00	.....	.....	.....	8.00	.....
Gibsonburg, Ohio	11.50	.....	.....	.....	8.00	10.00	.....	.....
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio	12.50	.....	.....	.....	.....	.....	.....	.....
Milltown, Ind.	.....	8.50@10.00	.....	10.00[8]	.....	.....	8.50[22]	1.35[10]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Scioto, Ohio	11.50	7.50	7.50	8.50	8.25	.62½	7.00	1.50
Sheboygan, Wis.	.....	10.50	.....	.....	.....	.....	9.50	2.00[4]
Wisconsin points[6]	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio	11.50	7.50	7.50	12.50	8.00	10.00[9]	8.00	1.50[3]
SOUTHERN:								
El Paso, Texas	.....	.....	.....	.....	.....	.....	7.00	1.50
Frederick, Md.	.....	8.00@9.50	8.00@9.50	.....	.....	9.50[15]	7.00[15]	.....
Graystone & Landmark, Ala.	12.50	9.00	.....	.....	.....	.....	7.00	1.35
Keystone, Ala.	19.00	9.00	9.00	10.00	.....	.....	7.50	1.35
Knoxville, Tenn.	19.00	9.00	9.00	9.00	.....	.....	7.50	1.35
Ocala, Fla.	.....	10.00	9.00	.....	.....	.....	10.00	1.40
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
Los Angeles, Calif.	15.00	14.00	12.00	18.00	.....	.....	13.50	.....
San Francisco, Calif.	19.50	16.00	12.50	16.00@19.50	14.50	.90[17]	14.50	1.85[17]
Tehachapi, Calif.[23]	10.80	.....	6.75[11]	12.00	.....	.....	10.30	.....
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00	.....	18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel; in bbl. .95. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9]80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8.00. [16] To 1.70. [17] Less credit for return of empties. [22] To 9.00. [20] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Warwick, Ohio	.....	2.00
Zanesville, Ohio	.....	2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc (for grinding) 4.00@50.00
- Ground talc (20-50 mesh), bags 8.00
- Ground talc (150-200 mesh), bags 8.50@15.50
- Pencils and steel crayons, gross 1.00@ 2.00

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags 9.00@10.00
- Same, burlap bags, bags extra 8.00@ 9.00

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Cromleys Mt., Md.:
- Crude talc 63.00

Dalton, Ga.:
- Crude talc (for grinding) 5.00
- Ground talc (150-200 mesh), bags 12.00
- Pencils and steel worker's crayons, per gross 1.00@ 2.50

Emeryville, N. Y.:
(Double air floated) including bags;
- 325 mesh 14.75
- 200 mesh 13.75

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh 15.50@20.00

Henry, Va.:
- Crude (mine run) 3.50@ 4.00
- Ground talc (150-200 mesh), bags 9.50@14.00

Joliet, Ill.:
- Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00@30.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Columbia, Tenn.—B.P.L. 65-70%	3.50@ 4.50
Gordonsburg, Tenn.—B.P.L. 65-70%	3.75@ 4.00
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lb.)

Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	3.75@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)
(Per Ton)

Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—Per ton,	
Mine run	300.00
Clean shop scrap	25.00
Mine scrap	22.50@24.00
Roofing mica	37.50
Punch mica, per lb.	.12

Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt. — English pink, English cream and coral pink	¶12.50@‖14.50	¶12.50@‖14.50
Brighton, Tenn.—Pink marble chips	§3.00	§3.00
Crown Point, N. Y.—Mica spar		9.00@10.00
Davenport, Ia.—White limestone, in bags	6.00	6.00
Easton, Penn.		8.00@ 9.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash		11.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt.—Middlebury white	¶9.00@‖10.00	¶9.00@‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		4.00@ 5.50
Phillipsburg, N. J.—Royal green granite		14.00@18.00
Randville, Mich.—Crystalite crushed white marble, bulk	4.00	4.00@ 7.00
Rose pink granite, bulk		12.00
Stockton, Calif.—"Natrock" roofing grits		16.00@20.00
Tuckahoe, N. Y.—Tuckahoe white	10.00	
Warren, N. H.		¶7.90@‖8.95
Wauwatosa, Wis.		20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

†C.L. L.C.L. 16.00.
§Bulk, car lots, minimum 30 tons.
¶C.L. ‖L.C.L.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; analysis, K_2O, 9.63%; Na_2O, 1.01%; SiO_2, 69.72%; Fe_2O_3, .00%; Al_2O_3, 18.6%; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 40 mesh to 200 mesh	15.00@28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 12.50@14.00; bulk	11.00@12.50
Pulverized. 95% thru 200 mesh; bags, 19.73@23.50; bulk	15.75@22.50
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18 20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis. K_2O. 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk. (Bags 15c extra.)	18.00
Crude feldspar, bulk	10.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_3; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich.(Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass. (Limestone	‡7.50@*9.00
Davenport, Ia.—(Limestone) bags, per ton	6.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton, including sacks	14.00
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks. per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	8.00
Wisconsin Points—(Limestone), per ton	15.00
Winona, Minn.—(Limestone), sacked, per ton, $8.00; bulk, per ton	6.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	10.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	13.00@16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00@19.00*
Jackson, Mich.	13.00
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.50
Madison, Wis.	12.00@12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50@15.00*
Pontiac, Mich.	12.00
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	16.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River. N. J.	13.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada (f)	†15.00*
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M. 10th of month. (d) 5% disc., 10th of month. (e) Delivered in city limits. (f) F.o.b. yard, 12.50.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.		3.70
Atlanta. Ga.		2.35
Baltimore, Md.		2.25@2.65
Birmingham. Ala.		2.10
Boston, Mass.	.68¼	2.33@2.73
Buffalo, N. Y.	.62½	2.10‡@2.50
Butte, Mont.	.90¾	3.61
Cedar Rapids, Iowa		2.24
Charleston, S. C.		2.35
Cheyenne, Wyo.	.64	2.56
Chicago, Ill.	.51¼	2.05
Cincinnati, Ohio		2.22
Cleveland, Ohio		2.24
Columbus, Ohio		2.22
Dallas, Texas		2.00
Davenport, Iowa		2.24
Dayton, Ohio		2.22
Denver, Colo.	.63¾	2.55
Des Moines, Iowa		2.05
Detroit, Mich.		1.95
Duluth, Minn.		2.04
Houston, Texas		2.00
Indianapolis, Ind.	.54¾	2.19
Jackson, Miss.		2.04
Jacksonville, Fla.		2.20
Jersey City, N. J.		2.13@2.53
Kansas City, Mo.		1.92
Los Angeles, Calif.	.60	2.40
Louisville, Ky.	.55½	2.22
Memphis, Tenn.		2.04
Milwaukee, Wis.		2.20
Minneapolis, Minn.		2.12@2.22
Montreal, Que.		1.60
New Orleans. La.		2.07
New York, N. Y.	.60¾	2.03@2.43
Norfolk, Va.		2.07
Oklahoma City, Okla.		2.46
Omaha, Neb.		2.36
Peoria. Ill.		2.22
Philadelphia, Penn.		2.21@2.61
Phoenix, Ariz.		3.91*
Pittsburgh, Penn.		2.04
Portland, Colo.		2.80
Portland, Ore.		2.40
Reno, Nev.		2.91
Richmond, Va.		2.40@2.80
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.		2.21
Savannah, Ga.		2.50
St. Louis, Mo.		1.95
St. Paul. Minn.		2.12@2.22
Seattle, Wash.		2.50†
Tampa, Fla.		2.25
Toledo, Ohio		2.20
Topeka, Kan.		2.41
Tulsa, Okla.		2.33
Wheeling. W. Va.		2.12
Winston-Salem, N. C.		2.29

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¾	1.75
Bellingham, Wash.		2.10
Buffington, Ind.		1.80
Chattanooga. Tenn.		2.45*
Concrete, Wash.		2.25
Davenport, Calif.		2.05
Hannibal, Mo.		1.90
Hudson, N. Y.		1.75
Leeds, Ala.		1.65
Lime and Oswego, Ore.		2.50‡
Mildred. Kan.		2.35
Nazareth, Penn.		2.15
Northampton, Penn.		1.75
Richard City, Tenn.		2.05
Steelton, Minn.		1.85
Toledo, Ohio		2.20
Universal, Penn.		1.80

NOTE—Add 40c per bbl. for bags.
*Includes sacks. ‡10c discount, 15 days.
†10c discount 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	¼x32x 36". Per M Sq. Ft.	Wallboard, ¾x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.70	4.00	4.00	4.00	4.00	4.50						15.00	20.00
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u					11.70u			
Blue Rapids, Kan.	1.70	4.00					10.00					15.00	20.00
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50			13.50			
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.					14.30o	12.30m		m9.00@11.00o					
Delawanna, N. J.								7.25			13.00	14.00	
Douglas, Ariz.			6.00	14.50	15.00		18.00		30.00				
Fort Dodge, Iowa	1.70	4.00	6.00	9.00	9.00	9.50				19.00		15.00	20.00
Grand Rapids, Mich.	2.65	4.00	6.00	6.00	9.00	9.00	17.65		22.75	19.00	12.00	15.00	18.00
Gypsum, Ohio	1.70@3.00	4.00	6.00	7.00@9.00	9.00	9.00	19.00	7.00	24.50	19.00		15.00	20.00@25.00
Los Angeles, Calif.		7.50@9.00	7.50@9.00		11.50@13.50								
Medicine Lodge, Kan.	1.70	4.00							15.00			15.00	20.00
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00		20.00	30.00
Portland, Colo.				10.00									
San Francisco, Calif.			9.00	13.40	14.40		15.40						
Seattle, Wash. (b)	6.00	10.00	10.00	13.00									
Sigurd, Utah									21.50				
Winnipeg, Man.	5.50	5.00	7.00	13.00	14.00	14.00					20.00	25.00	33.00

NOTE—Returnable bags. 10c each; paper bags. 1.00 per ton extra (not returnable). (a) Hardwall plaster. 13.00; casting, finishing, molding, 14.00.
(b) Calacoustic plaster 10.00 at mill; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Chicago District	200.00¶	.....	.....
Columbus, Ohio	16.00	.....	.....
Detroit, Mich.	.15@ .17†	.....	.24@.26†
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	15.00*	.....	.....
Graettinger, Iowa	.16@ .18	.....	.....
Indianapolis, Ind.	.10@ .12a	.....	.....
Los Angeles, Calif.	4x8x12—5.00*	4x6x12—4.20*	
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.18@ .20	.....	.....
Tiskilwa, Ill.	.16@ .18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.	
Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Chicago District (Haydite):	
4x 8x16, per M	140.00
8x 8x16, per M	220.00
8x12x16, per M	300.00
Columbus, Ohio:	
5x8x12	6.50
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12	8.00
Longview, Wash.:	
4x6x12	5.00
4x8x12	6.25
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
	Per 100
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
	Each
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .13; 12-in., .17½; 14-in., .25; 16-in., .32; 18-in., .40; 20-in., .50; 24-in., .80; 26-in., 1.00; 28-in., 1.10; 30-in.	1.25
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per M:	
3 in.	40.00
4 in.	50.00
6 in.	75.00
8 in.	100.00
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	.....
Chicago District	16.00	.....
Columbus, Ohio	16.00	17.00
El Paso, Tex. — Clinker	13.00	13.00
Ensley, Ala. ("Slagtex")	9.00@12.00	.....
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00	32.00
Mt. Pleasant, N. Y.	.....	14.00@ 23.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	14.75	16.50
Portland, Ore.	17.50	23.00@ 55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	18.00	30.00@ 35.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich.	4 in. to 12 in., 72% off standard sewer price list; 15 in., 65% off; 18 in. to 24 in., 62% off; 27 in. to 36 in., 60% off																
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Longview, Wash.	Sewer pipe 40% off list; culvert—list																
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.	6 in. to 24 in., $18.00 per ton																
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.	12.00 per ton																
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	.70	1.55	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.10	1.60	.....	1.90	.....	2.25	3.40	.....	5.50	.....	.....
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced. (c) Delivered on job; 5% discount, 10th of month. †21-in. diam. ‡Price per 2-ft. length.

Penn.-Dixie Cement Corp. Using Concrete Block for Employe Houses

FOR THE PAST SEVERAL WEEKS the Elkan Stone Tile Manufacturing Co., Macon, Ga., has been shipping from its plant at the foot of Poplar street, a solid car load of stone tile or cast stone every day to Clinchfield, Ga., to be used in the construction of a model, fireproof, concrete subdivision.

This ambitious program of construction is being put on by the Pennsylvania-Dixie Cement Corp., makers of Clinchfield cement, on the Hawkinsville road, about five miles from Perry, Ga.

The subdivision is to furnish homes for the heads of all departments of the big plant as well as some of the other employes. At the outset there will be erected nine houses, a hotel, bath and locker house beside a shipping clerk's office that has already been completed.

Typical Spanish design has been adopted by the architect, Claude W. Shelverton, of Macon, who, with Charles Vance, superintendent of the mill at Clinchfield, and Mr. Holm, engineer, has planned the houses.

No two buildings will be alike in appearance although the floor plans are somewhat similar. The dwellings are models of fireproof construction. All exterior walls are of eight-inch stone tile without other finish. The partitions throughout are of four-inch stone tile while all floors are of concrete and ceilings of celetex, a new fireproof composition material.

All houses are ornamented throughout with cast stone manufactured by the Elkan Stone Tile Manufacturing Co., Macon. There are cast stone window sills, copings, shields, brackets, flower boxes and other ornamental pieces on the exterior while all interior mantels are also cast stone and fireplaces of stone tile.

The bath house is of reinforced concrete construction with six-inch stone tile curtain walls and partitions.

Although in the country this subdivision has all city conveniences such as water, sewage, electric lights, telephone and everything that could be had in town.—*Macon* (Ga.) *News*.

New Executive of the Southern California Rock Products Association

AS NOTED briefly in the July 21 issue of ROCK PRODUCTS, p. 72, the Southern California Rock Products Association has a new executive—C. B. Wirsching. We referred to him as manager of the association, but he writes us that in reality he is the executive engineer, although the management of the association is within the scope of his duties. In other words, we understand, the California producers recognizing the need of expert technical advice on both production and sales, have organized along the lines of the Wisconsin and Missouri Valley associations.

Prior to becoming executive engineer of the Southern California Rock Products Association Mr. Wirsching was connected with the division of highways, State of California, as principal assistant district engineer, and with Los Angeles County as district engineer. He served two years in the world war as a major of engineers with the second division in France and as army roads officer of the second army.

July Safety Record of Cement Industry

WORKING on the theory that reducing accidents makes for prosperity, the portland cement industry has completed another month of record-breaking safety in operation. Following the lowest accident month in its history, July mishaps numbered only 65 lost time and one fatal. June, 1928, set a record for the industry with 48 accidents causing loss of time and one fatality.

July, 1927, recorded 103 mishaps and two fatalities. Thus with more mills reporting to the Portland Cement Association than last year accidents for the month of July were reduced 37%.

In addition to making July of this year the safest July in the history of the business the second quarter of 1928 has a lower number of accidents than any other three-month period. Only 200 accidents were suffered by cement mills and quarries located throughout United States and Canada during the past three months—10% less than for any other similar period since accident statistics have been reported to the association.

Figures further show that the first six months have been operated by cement mills with 15% less accidents than ever before for a half year. The total accidents for seven months of 1928 are 618 lost time and 16 fatal —last year 789 lost time and 18 fatalities were suffered.

In addition to these unusual safety figures two cement mills have operated for over two years without accident. The Cowell, Calif., plant of the Cowell Portland Cement Co., and Newcastle, Penn., No. 3, of the Lehigh Portland Cement Co., are the mills reaching this high plane in safety work.

Thirty-eight plants in the cement industry have operated since January 1, 1928, without an accident involving the loss of time. These plants are still in the race to receive the Portland Cement Association safety trophy for a year's operation free from accidents.

Wisconsin's Pioneer Lady Lime Manufacturer

MRS. HENRIETTE E. ROTH, widow of Henry E. Roth, a pioneer settler of Sheboygan, Wis., died July 22 in her eighty-eighth year.

Mrs. Roth was born January 14, 1841, at Warnitz, Germany. She came to this country with her parents, Mr. and Mrs. Gottlieb Kanitz, when she was eleven years of age.

Mrs. Henriette E. Roth

Her father died one year after the family had arrived here and her mother followed in death two years later.

On September 5, 1860, she was united in marriage to Henry E. Roth, whose first wife, a sister of Mrs. Roth, died leaving four children. Nine children were born of the second union of Mr. Roth, one of whom died in infancy. These twelve children Mrs. Roth reared until they were able to take care of themselves.

From the time of her husband's death, which occurred March 7, 1887, she was the active president of the Sheboygan Lime Works up to the time of her death. She attended a meeting of the directors of this organization July 16, last. She was also treasurer of the Roth Building Supply Co. since its organization in the year 1920. She possessed an unusually keen mind and because of her foresight and good judgment her advice and her suggestions were sought almost up to the hour of her death.

Her motto through life was "Thue Recht und scheue Niemand," which translated into English is "Do right and fear no one." She was a lover of all that is best in literature and music, and was competent to discuss the highest classics, both English and German, and to review modern books and magazines as well. Her favorite quotation was "Grosse Gedanken und ein reines Herz das ist's was wir uns von Gott erbitten sollten."—Goethe. This in English reads: "Noble thoughts and a pure heart are what we should beseech from God." She was particularly interested in books on travel because she had, during her lifetime, traveled extensively through European countries.

She is survived by three daughters and two sons. They are Mrs. Louise Brand of Chicago, Mrs. W. R. Kowalke and Miss Elfrieda H. Roth of Sheboygan, Henry E. Roth of Chicago, and William of Sheboygan. A brother nearly 90 years of age, Louis Kanitz of Muskegon, Mich.; a sister, Mrs. Martin Schultz of Sheboygan, 22 grandchildren and 19 great-grandchildren also survive.

Miss Elfrieda H. Roth, one daughter, is the general manager of the Sheboygan Lime Works and has taken a prominent part in proceedings of the National Lime Association for a number of years.

Utah Rock Asphalt Corp. Plant Said to Be Ready for Operation

WITH THE ARRIVAL June 30 of the last shipments of machinery for the rock crusher plant of the Utah Rock Asphalt Corp., near Sunnyside, Utah, General Superintendent Henry H. Jones of that corporation feels that he would have the machinery installed and production of road surfacing material from the rock asphalt quarries by the end of July.

The spur of the Denver and Rio Grande railroad from Sunnyside to Silica, the factory site, a distance of six miles, has been completed. Employes of the corporation have been installed in a group of houses, rented by the corporation from the Utah Fuel Co., at Sunnyside.

The factory will have a weekly capacity production of about six carloads, or approximately 250 tons. The marketable product has a value of $6 per ton, it is said. Enough sales have already been contracted to insure the factory running far into the summer.

The corporation was organized last summer by a group of Colorado promoters, who secured the land holdings in that region, sold their holdings during the winter to C. N. Power of Chicago, president of the Midland Banking Co., and others, including Dr. Herbert A. Black of Colorado Springs, and Major General John F. Cregin, U.S.A., retired, of Pueblo.

The land holdings of the company are said by geologists to contain more than one billion tons of the rock, which bears a high content of asphalt.—*Salt Lake City* (Utah) *Tribune.*

Northeastern Ohio Sand and Gravel Producers Prepare for National Convention

THE SAND AND GRAVEL PRODUCERS of northeastern Ohio, centering about Cleveland, met at the Sleepy Hollow Country Club, Brockville, Ohio, near Cleveland, on August 8, to consider plans for the next annual convention of the National Sand and Gravel Association, which will be held at the Hollenden hotel, Cleveland, January 9, 10 and 11, 1928. In spite of a day of much

Hal G. Knight

pleasure and recreation, all necessary business was transacted and committees appointed to take active charge of convention arrangements.

Hal G. Knight, president of the Northeastern Ohio Sand and Gravel Producers' Association, presided. Mr. Knight is the general manager of the Rubber City Sand and Gravel Co., Akron, Ohio. The following committees were appointed in connection with the coming annual convention of the National Sand and Gravel Association:

General Chairman—Hal G. Knight, the Rubber City Sand and Gravel Co., Akron, Ohio.

Entertainment—C. E. Glander, American Aggregates Corp., Massillon, Ohio.

Publicity—Clarence Ehle, the Cleveland Builders Supply and Brick Co., Cleveland, Ohio.

Registration—Norman Callahan, M. A. Callahan Co., Cleveland.

Exhibit—D. G. Callahan, M. A. Callahan Co., Cleveland.

Program—Frank Aulenbacher, the Cleveland Builders Supply and Brick Co., Cleveland.

Ladies—Mrs. Frank Aulenbacher, Mrs. Clarence Ehle and Mrs. Norman Callahan, Cleveland.

Other Business

The following guests were introduced, at the conclusion of a very enjoyable luncheon: V. P. Ahearn, executive secretary of the National Sand and Gravel Association, Washington, D. C.; W. L. Underwood, assistant manager of the convention board, Cleveland Chamber of Comerce; George Medinger, New Jersey Wire Screen Co., Cleveland; M. B. Garber, Thew Shovel Co., Lorain, Ohio; Nathan C. Rockwood, editor and manager of ROCK PRODUCTS, Chicago, Illinois.

The Ohio highway situation and dealer problems were discussed. Mr. Knight called the attention of the association to the fact that the Ohio eastbound freight rates for interstate movement are on a higher mileage than the interstate rates from Pennsylvania into Ohio.

Mr. Ahearn gave an outline covering the duties of the various committees of the national convention. A special meeting was arranged with the chairman, David Callahan of the exhibit committee, and with Frank Aulenbacher, chairman of the program committee, also with Clarence Ehle, chairman of the publicity committee.

The following member companies were represented:

American Aggregates Corp., M. G. Kerr and C. E. Glander.

Massillon Washed Gravel Co., Navarre, E. P. Thomas.

A. J. Clementz Sons, Massillon, Elmer Clementz.

Cleveland Builders Supply and Brick Co., Frank Aulenbacher, Clarence Ehle and J. Morrisey.

M. A. Callahan Co., Cleveland, D. G. Callahan, Norman Callahan and Frank Callahan.

Mantua Sand and Gravel Co., Mantua, Carl A. Boulken.

Kent Sand & Gravel Co., Co., Youngstown, F. J. Bowers, Lee R. Farrell and Ralph Walling.

Rubber City Sand and Gravel Co., Akron, Hal C. Knight, W. G. Harris and R. G. Holway.

Meeting of Manufacturers' Division of National Sand and Gravel Association

THE annual pre-convention meeting of the Manufacturers' Division of the National Sand and Gravel Association was held at the Hollenden hotel, Cleveland, Ohio, August 9, to perfect plans for the exhibit in connection with the coming annual convention of the association, at this hotel, January 9, 10 and 11, 1929. H. M. Davison, chairman of the division, presided, and V. P. Ahearn, executive secretary of the National Sand and Gravel Association, was present as secretary of the manufacturers' division. Dave Callahan, of the M. A. Callahan Co., sand and gravel producers, Cleveland, Ohio, was present as representing the producers' committee.

Various details in connection with the exhibit were fully discussed and the ballroom of the hotel where the exhibit is to be held was inspected. It was decided to make the charge for booth space $50, to cover all incidentals except special electrical connections and handling charges on excessively large exhibits. Ample room will be provided for exhibiting to the best possible advantage and every location in the room will be easy of access. The convention room will be immediately adjacent to the exhibit and the formal sessions will be so arranged that producers will have time and facility for visiting every booth. The privilege of exhibiting is extended only to those firms which are associate members of the national association.

The new constitution of the manufacturers' division as drawn up by the secretary and executive committee was approved with a slight change in the by-laws providing for amendments.

A committee of the manufacturers' division to co-operate with the local producers' committee in charge of convention details was appointed as follows: M. B. Garber, Thew Shovel Co., Lorain, Ohio; A. E. Reed, W. S. Tyler Co., Cleveland; G. A. Nedinger, New Jersey Wire Cloth Co., Cleveland.

The following associate members of the National Sand and Gravel Association were present:

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., represented by V. E. Walters.

American Manganese Steel Co., Chicago Heights, Ill., Perry Nagle.

Blaw-Knox Co., Pittsburgh, Penn., H. B. Fuller.

Bucyrus-Erie Co., Erie, Penn., Morton Eschner.

Fairbanks-Morse Co., Chicago, Ill., C. E. McLaughlin.

H. M. Davison

General Electric Co., Schenectady, N. Y., L. W. Shugg.
Harnischfeger Corp., Milwaukee, Wis., H. M. Davison.
Hayward Co., New York City, H. C. Ryder.
Hendrick Manufacturing Co., Carbondale, Penn., B. G. Shotton.
Industrial Brownhoist Corp., Cleveland, Ohio, G. F. Clino, Jr.
Link-Belt Co., Chicago, Ill., C. S. Huntington.
Mead-Morrison Co., Chicago, Ill., P. T. Redfern.
New Jersey Wire Cloth Co., Trenton, N. J., Geo. A. Nedinger.
Rock Products, Chicago, Ill., Nathan C. Rockwood.
Sauerman Bros., Inc., Chicago, Ill., G. H. Tompkins.
Taylor-Wharton Iron and Steel Co., Highbridge, N. J., J. R. Smith.
Thew Shovel Co., Loraine, Ohio, M. B. Garber.
W. Toepfer and Sons Co., Milwaukee. Wis., J. Kulk.
W. S. Tyler Co., Cleveland, Ohio, G. A. Disbro.

New Company Opens Gravel Plant at Sampsell, Mo.

A RECENT discovery of good gravel deposits near Sampsell, Mo., northwest of Chillicothe, Mo., has resulted in the organization of the Johnson and Hudson Gravel Co., of which Carrollton, which has acquired control over the property. A modern sand plant has been erected for washing and screening the sand, having a capacity of 750 tons daily. Two steam shovels equipped with caterpillars are at work in the pit producing both day and night and on Sunday also.

The entire output from the Sampsell pit has been contracted for by the Missouri State Highway Commission, and it is reported that the contract will be renewed immediately upon its expiration. The $160,000 bond issue announced at Brookfield, Mo., recently for graveling country roads will go largely to the new company for gravel. The orders are on file at the present time and shipments will start as soon as possible. S. B. Halvorsen of Jefferson City, state gravel inspector, is on the property to inspect all material shipped, and it is reported that gravel men and contractors state that this deposit is of a fine quality for road work.

New Plant for Preparing Foundry Sand

GEORGE F. PETTINOS, 1206 Locust St., Philadelphia, Penn., has recently put into operation a new plant near Millville, N. J., for the screening and washing of molding and core sand. The product, which is to be known as "Foundry Flints," is being marketed with emphasis on the smooth roundness of the flints and the care with which they are prepared. With grain sizes which, it is stated, are properly proportioned, a given amount of oil will go much further in making cores than would be the case with sand of irregular shape.

Central Sand and Gravel Co. in Operation at Portland, Ore.

HEADQUARTERS of the Central Sand and Gravel Co., which handles retail sales in aggregate taken from the Willamette river at Portland, Ore., have been established in room 311, Weatherly building, Grand avenue and East Morrison street.

Drake O'Reilly, well known in the Portland construction field, is president of the company and in charge of operations.—*Portland* (Ore.) *Oregonian.*

Upper Ohio River Gravel Producers Busy

VAST IMPROVEMENTS have taken place within the last few days in the number of orders being booked by sand and gravel producers on the upper Ohio river, it was stated recently. Large contracts have been closed at Huntington, Charleston, Wheeling and Parkersburg. There also is considerable activity at Nitro and South Charleston.

The sand and gravel producers along the West Virginia shore have great hopes that the $35,000,000 road bond issue about to be voted on in West Virginia will pass, in which case it will mean several years of heavy production. It was said that this will react on the steel market, as considerable new equipment will be required, such as barges, dredge boats and propelling power, the largest part of which will be supplied by the Pittsburgh steel makers and fabricators.

The Dravo Contracting Co. has launched the first two of an order of five sand and gravel barges for the Van Sciver Corp., Philadelphia, from its Wilmington yards. These barges are 130x34x10 ft. At the Neville Island yard of the Dravo concern four standard sand and gravel barges for the trade were launched recently; they are each 100x26x6.6 ft.—*Pittsburgh* (Penn.) *Post-Gazette.*

Buffalo's Lake Stone Traffic Grows to Big Proportions

RECEIPTS of limestone to the end of July at Buffalo this season are said to be about equal to those of last season for the corresponding period, and the total at the close of 1927 for all lower lake ports was announced as 12,529,800 gross tons, a new record for this branch of lake commerce. The stone movement last season showed an increased of 11.13% over the previous high record of 1926, while ore shipments for the season were 12.69% less, compared with the previous season.

"Ten years ago we thought it wonderful when the lake fleet brought down 5000 tons of stone in a season," said Fred Harmon, the veteran retired engineering officer, who came here last week for the 46th annual outing of the Marine Scalpers. "The stone movement in those days depended to a great extent upon the movement of iron ore, but that condition no longer exists. Instead of following the downward trend of ore last year, the demand for stone in other channels of industry was so great the shipments of stone advanced to a new peak. And this is going to continue, for uses are being discovered for limestone year after year, it would seem.

"Buffalo, with its new cement works, has been taking a large quantity of stone; the big self-unloaders of the Bradley company keep bringing loads here from Calcite steadily to the steel plants, and other vessels are bringing stone here with much regularity. The steady increase in the stone movement, like that of soft coal from Ohio ports, has been helping the independent vessel companies quite materially."—*Buffalo* (N. Y.) *Courier-Express.*

Gravel deposit at Sampsell, Mo.

New Johnson and Hudson Gravel Co. plant

New Machinery and Equipment

New Line of Drifter Drills

THE Ingersoll-Rand Co. of New York City recently announced a new line of drills of the drifter type. These drills, three in number, are all of the same general construction, differing only in size. They emphasize simplicity of construction with streamlines and a pleasing appearance, it is stated in the company's announcement. Greater drilling speed, higher efficiencies and easier handling are some of the features claimed by the manufacturer.

Three sizes of new line of drills

The largest of these drifters, the "S-70," weighs 185 lb. and is recommended for heavy duty in hard rock and for deep holes. It is especially suited for tunnel work, large mine headings and in both dimension and crushed stone quarries, the makers say. The 138-lb. "N-75" machine fulfills the needs of the general run of work around the mine. Its power and speed enables it to do the work that formerly required machines from 20 to 40 lb. heavier, it is claimed. The "L-74" is a real one-man drill. It weighs 110 lb., yet is exceptionally powerful, it is stated. It is recommended for medium soft ground, for close working or where lightness is needed.

In dumping to the rear, the three-way dump body is elevated to 70 deg.

New Three-Way Dump Bodies

THE Commercial Shearing and Stamping Co. of Youngstown, Ohio, has announced new designs for the three-way dump bodies which the company manufactures for motor trucks, tractor trailers and similar vehicles using dump bodies. The feature of this body is the three-way hydraulic hoist, which is made in sizes to handle loads from 1½ tons to 15 tons, and which comprises a cylinder with a vertical underbody telescopic plunger. This hoist is mounted on double oscillating trunnions both at the top and the bottom. It is stated that this arrangement provides a direct force on the lift all of the time, applying the power directly to the load without the use of intermediate mechanical parts.

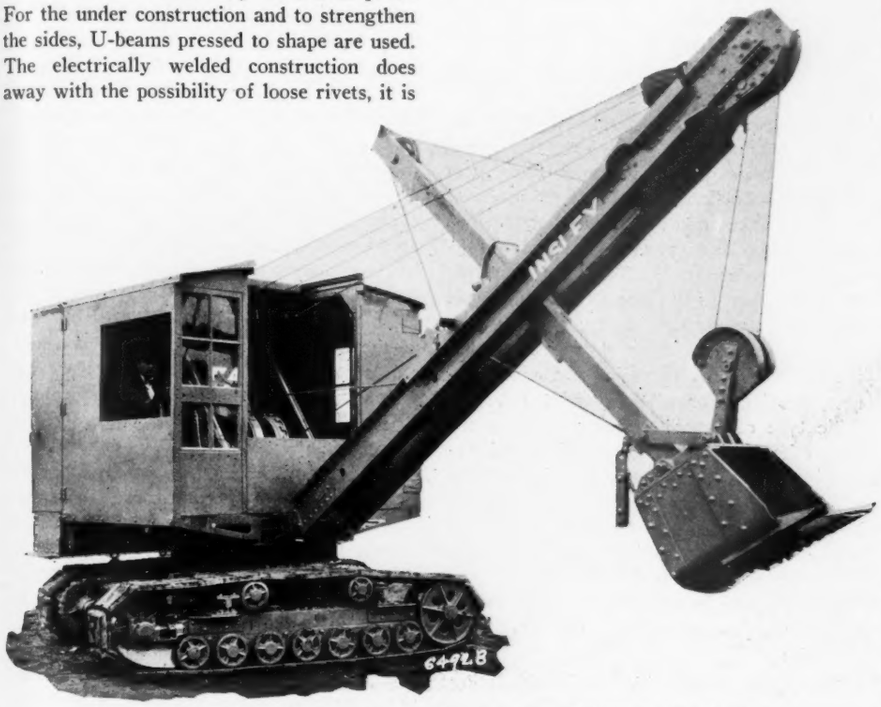
The hoist dumps to the rear or to either side, and being self-aligning, it is claimed that it is not subject to binding or twisting strains or stresses. The hoist is mounted near the center of the body, which is said to be the most advantageous position. The gates of the body do not open until the body has started its upward movement, but at a lift of only 16 deg. they are wide open, and remain so for the full lift. The gates can also be folded down when the body is not tilted, to permit easy loading. The gates

Side gate of new dump body opening automatically as body is elevated to 16 deg.

Load fully discharged from new body, showing how the material is carried clear of the wheels

are down folding, so that when dumping the material is carried out over the wheels and well to the side of the road or embankment. A side dumping angle of 54 deg. and a rear dumping angle ranging from 45 to 70 deg. is obtainable with these units.

The bodies are of pressed steel construction with removable corner posts pressed to dimensions and electrically welded in place. For the under construction and to strengthen the sides, U-beams pressed to shape are used. The electrically welded construction does away with the possibility of loose rivets, it is pointed out. The company states that the installation of these bodies can be made on any type of chassis at the company's plant. At present these bodies are standard equipment on the units of the Athey Truss Wheel Co. of Chicago.



New full-revolving excavator made for five different attachments

Full-Revolving, Convertible Excavator

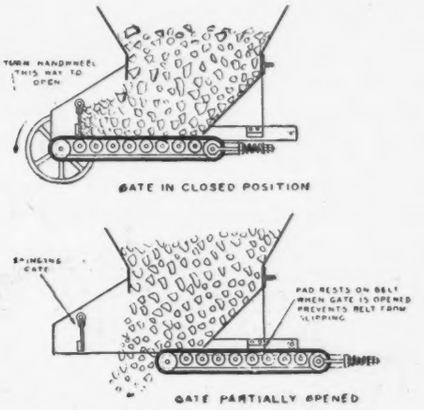
THE Insley Mfg. Co., Indianapolis, Ind., announces a new full revolving excavator to be known as the Type "R." It is made with five attachments, the shovel, pitcher, skimmer, crane and dragline, all of which are interchangeable. It is claimed the machine has many features of advanced design, including roller bearings for all shafts above the revolving frame, cut gears throughout, cast steel carbody, cast steel machinery base and side frames, separate control for each crawler, and one shot lubricator for crawler rollers. A special feature is the use of hydraulic brakes which operate separately on each crawler, and which are controlled from the operator's platform. These brakes operate as effectively in one direction as in the other, eliminating the necessity of dogs or chocks. Power can be applied to each crawler separately from the operator's platform.

Another feature of the excavator is the swinging which is 5 r.p.m., which combined with the line speed gives an exceptional operating speed, it is stated. It has a tail swing of only 7 ft.

As a shovel the Insley excavator uses the Insley patented cable crowd. The standard shovel boom is 17 ft. 6 in. long, giving a dumping clearance of 12 ft. 6 in., or the shovel can be equipped with a high lift boom and dipper for any clearance up to 15 to 16 ft. It has a gear driven power boom hoist which is self locking without the use of brakes or dogs. The ditcher uses the same boom as the shovel, and has an effective digging depth of 18 ft. The skimmer has a digging radius of 20 ft. 6 in. from the center of rotation, a dumping clearance of 10 ft. and carries a bucket with ½ yd. working capacity. The crane has a 35-ft. boom as standard equipment, and can be equipped with a longer boom if necessary. Its capacity is 5200 lb. at 18 ft. radius, 4500 lb. at 20 ft. radius and 2500 lb. at 30 ft. It has more than ample capacity to handle a ½-yd. clamshell, it is claimed. The power boom hoist mentioned is of value on crane work, as the boom can be moved under a load.

New Bin Gate Rolls from Under the Load

STEPHENS-ADAMSON MFG. CO., Aurora, Ill., have announced a new bin gate, designed on entirely new lines, which is known as the "Moore" gate. In this device, the gate plate, which is of belt convey-


TURN HANDWHEEL THIS WAY TO OPEN
GATE IN CLOSED POSITION
SPINNING GATE
PAD RESTS ON BELT WHEN GATE IS OPENED PREVENTS BELT FROM SLIPPING
GATE PARTIALLY OPENED

Showing construction of bin gate which rolls from under the load

or design, rolls out from under the load without friction. In the same manner the gate rolls into position, closing the opening without the gate plate friction found in other bin gates, according to the manufacturers. It is claimed that regardless of the load on this new gate, the opening and closing is easily accomplished. The "Moore" gate requires a minimum of head room for its installation, it is stated. It is made in various sizes.

New bin gate built on the principle of the belt conveyor

R. B. Tyler Sells His Interest in R. B. Tyler Co.

ANNOUNCEMENT has been made of a change of control of the R. B. Tyler Co., one of the largest and oldest building supply firms in Louisville, Ky.

R. B. Tyler, founder and president of the company, has disposed of his interest in the business to R. M. Trimble, Jr., of Mt. Sterling, Ky., who becomes president and general manager. R. S. Tyler, formerly sales manager of the Peerless Manufacturing Co., of Louisville, becomes vice-president. In addition to the building supply business Tyler company operates quarry and crushed rock enterprises, as well as doing a considerable business in road oiling and graveling.

"Col." R. Brink Tyler will continue operating an individually owned similar business at Glasgow, Ky., specializing in road work.

Portland Cement Association Cited for Alleged Unfair Business Methods

THE PORTLAND CEMENT ASSOCIATION is charged with unfair methods of competition in a complaint issued by the Federal Trade Commission on July 31.

The complaint alleges that the association has circulated printed matter designed to promote the adoption and construction of concrete roads in all parts of the country and "disparaging the merits" of the road construction of the American Vibrolithic Corp., "a competitor."

The American Vibrolithic Corp. is interested in promoting a type of concrete pavement in which additional coarse aggregate is vibrated or pounded into the pavement after it has been laid, but before it has hardened. There is said to be a 25c. per square yard royalty the contractor must pay the owners of the patents; and presumably the construction costs are also appreciably higher than those for an ordinary concrete pavement because of the extra labor and equipment required. Who is competent to pass on the alleged merits of a "Vibrolithic" pavement as compared with an ordinary concrete pavement, which is the real point in issue? The editor has seen cores of "Vibrolithic" pavement from Wisconsin roads which contained great voids, where there was neither mortar nor cement, or anything but air or vacuum. It was said to be caused by the arching of the pounded-in stone. We presume there has been widespread experience, both good and bad, by competent state and municipal engineers whose testimony may be relied upon.

Therefore the coming hearing before the Federal Trade Commission will be of extraordinary interest to all trade or industrial associations, which, like the Portland Cement Association, are primarily engaged in research and educational work—in trying to determine the most economical way to use their materials to the greatest ultimate advantage of the user, and, therefore of course, to the producers of the material. How far such an association can go in making public and interpreting its findings and results of research and experience may possibly become subject to government bureaucratic restrictions.

Seven specific charges of alleged unfair methods are cited by the commission in its complaint. The commission set September 19 as the date for a hearing on the complaint, the full text of which follows:

"In the course of its promotion of its members' profits, the respondent association, through its agents or representatives in different sections and places in the United States, has sought to influence those who control the making, awarding or approval of road construction contracts by statements, oral, written and printed, falsely disparaging and discrediting the Vibrolithic method; by addressing to engineers, public officials and property owners, through the public press or otherwise, false, deceptive or misleading statements regarding the expensiveness, durability or efficiency of the Vibrolithic type of concrete paving as compared with other pavement; by securing and exercising political influence, and by various other means; and said respondent association has, in the course of its business activities, practiced aforesaid various unfair methods of competition against the American Vibrolithic Corp. and its licensees, and has adopted and used, among others, the following methods:

"(a) By distributing and circulating among engineers and public officials connected with the letting of road contracts a report on road construction purporting to be the independent production of a skilled road engineer, based on scientific and unprejudiced research and information, but which said report was not the unbiased and independent production of said engineer but was inspired and procured, and paid for, by persons interested in paving other than Vibrolithic, and which report contained false and misleading representations disparaging to and tending and calculated to discredit the Vibrolithic method of road construction; including false and misleading representations as to the character and condition of Vibrolithic pavements in various towns in the State of Iowa, among them, Missouri Valley, Fairfield, Charlton, Le Mars, Wapello, Marshalltown, Cedar Heights.

"(b) By procuring the publication in an engineering magazine of an article inspired by and prepared for said respondent association disparaging and discrediting the Vibrolithic method of road construction, and by distributing and circulating same among engineers and public officials charged with the letting of road contracts in the several states of the union as the report or work of a disinterested and impartial engineer.

"(c) By circulating false and misleading representations among engineers and public officials connected with the letting of road contracts, as to the results of the Vibrolithic method of construction, by misrepresenting the condition of a part of the Sheridan Road, out of Chicago, Illinois, as an example of Vibrolithic construction, and misrepresenting the results of certain so-called tests of concrete construction for road purposes, in the city of Seattle, Wash., in the fall of 1926, as a true test of the Vibrolithic methods.

"(d) By causing editorials or special articles to be published in various newspapers in different sections of the country disparaging and discreditng the Vibrolithic method of road construction with the appearance of expressing the opinion of disinterested and impartial writers when, in fact, said editorials or special articles were either prepared by officers and employes of respondent association or were inspired by or paid for by said association; including false representations that the cost of Vibrolithic pavement included cost over and above the cost of the ordinary type of concrete pavement, representing royalties, and that tests had shown the superior strength of the ordinary type of concrete road construction over the Vibrolithic type.

"(e) By misrepresenting as unreasonable and inequitable the cost of road construction by the Vibrolithic method by representing that the charge for the use of the Vibrolithic method and machinery represented so much in addition to the cost of the ordinary type of concrete construction.

"(f) By widely distributing among state, county and municipal officers having charge of construction of public roads, a pamphlet or bulletin decrying and condemning methods used in the construction of Vibrolithic pavements, said pamphlet or bulletin appearing to be the disinterested opinion of the head of an engineering institute, whereas, its author was an employe of respondent association and the said institute was largely supported by the respondent association.

"(g) By expenditure of large sums of money for advertisements of respondent association and the business of its members in newspapers and periodical publications with the purpose of and with the result of securing the insertion in said publications of matter supplied or inspired by said respondent association or its agents as original and independent productions of said publications, disparaging and discrediting the Vibrolithic method of road construction."

Florida Phosphate Mines Working Double Shifts

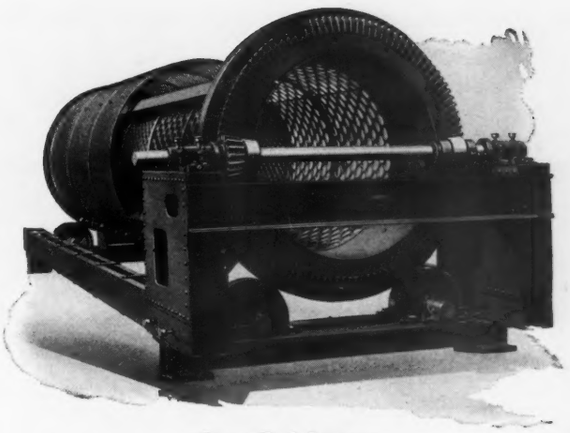
THE PHOSPHATE MINING CO., with headquarters in Nichols, Fla., has added sufficient men to its working force so as to permit the operation of its mines on a double shift.

The company operates mines at Phosmico, in East Bartow, and at Nichols and Mulberry. The main works are at Nichols.

The Southern Phosphate Co. is planning to reopen the mines at San Gully, near Lakeland.—*Mulberry* (Fla.) *Press.*

Consumers Good-Will

(The goal of all producers, whether it be the producer of commercial aggregate or the manufacturer of machinery.)



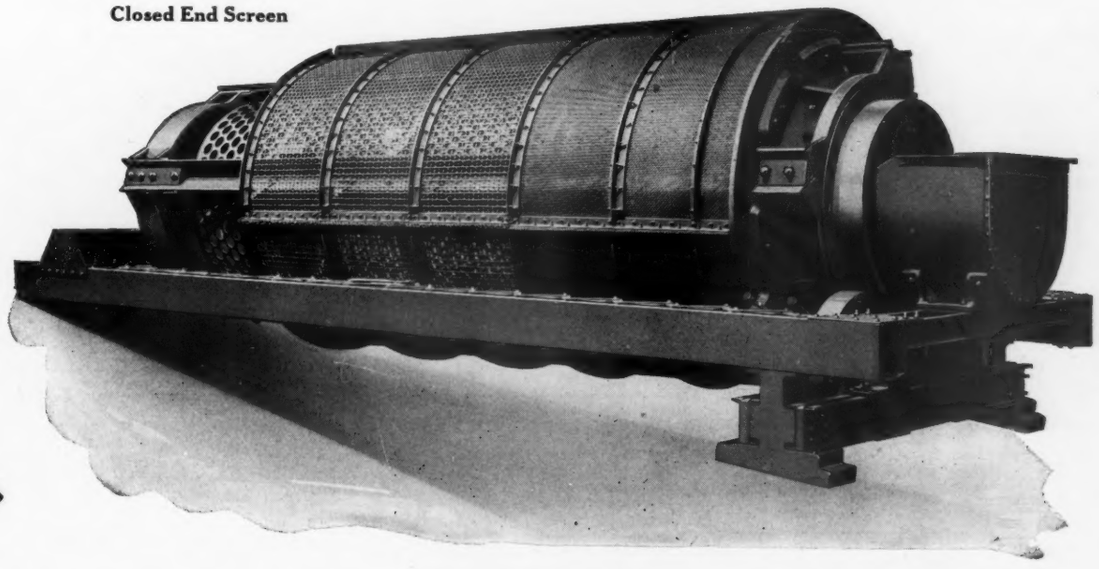
Open End Screen

THE commercial aggregate producer is constantly striving to produce clean, accurately sized aggregate of the proper screen analysis to meet specifications and hold the good will of their customers, all of which is governed by the proper application and selection of crushing and screening equipment.

Allis-Chalmers throughout its years of serving the aggregate producer has maintained good will by its high standard of quality and its diversified line of equipment together with the proper application of its products to the producers' problems.

The Allis-Chalmers' line of sizing equipment includes closed end revolving screens built in various standard sizes from 24″ to 72″ in diameter and open end screens in standard sizes, 48″ to 84″ in diameter, also multi-roll sizers or grizzleys, all of which insures the purchaser of sizing equipment an unbiased recommendation based on his particular problem.

Closed End Screen



ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

When writing advertisers, please mention ROCK PRODUCTS

News of All the Industry

Incorporations

B. and H. Gravel Co., New Bremen, Ohio.

Delco Concrete Products Co., Trainer, Penn. C. L. Crosgrove, Linwood, Penn.

Norris Sand Products Co., Norristown, Penn., $15,000. J. B. Marshall, Wilmette, Ill.

Escambia Concrete and Supply Co., Gregory St., Pensacola, Fla., $35,000. Ready-mixed concrete.

New Orleans Concrete Pipe Co., New Orleans, La., $40,000. Hy. P. Egan, Patrick A. Mitchell.

John Fiadini Co., Bayonne, N. J., $25,000. Benjamin Barron, Bayonne. Cement products manufacture.

Peninsula Granite Quarries, Ltd., Peninsula, Ont., $40,000. A. D. McKenzie, Toronto, and others.

Kanagua Sand and Gravel Co., Toledo, Ohio, $25,000. C. A. Zinn, W. A. Belt, Jr., H. R. Block.

Producers Sand and Gravel Co., Seattle, Wash., $50,000. J. L. Davidson, E. P. Whiting and R. J. Meakim.

Central Sand and Gravel Co., Portland, Ore., $5000. Maude M. Shaw, Inez P. Goodrich, Flora L. Becker.

Freund Concrete Products Corp., Farmingdale, N. Y., 200 shares, no par. W. R. Curnan, Long Island City, N. Y.

Greenfield Granite and Marble Co., Greenfield, Mass., 500 shares, no par. Lockwood L. Negus, Lee L. Taylor, Joseph T. Bartlett.

Peru Gravel and Sand Co., Peru, Ind., $5000 common, $5000 preferred. Charles P. Welch, Herbert L. Howard, Russell R. Rhodes.

Huguenot Sand and Gravel Co., Richmond, N. Y., 1000 to 1500 shares, of which 1000 are preferred, $100 each; 500 common, no par.

L. D. Phillips Construction Co., Westfield, Mass., $50,000. Louis D. Phillips, Santo D. Phillips, Bertha M. Phillips. Manufacture of building supplies.

Colorway, Inc., 3800 S. Racine Ave., Chicago, Ill., $27,500. Francis E. Hinckley, Chester W. Kulp, Bernard Barnard. To manufacture mineral products, paint colors, etc.

Niagara Cut Stone Co., Ltd., Niagara Falls, Ont. 1000 shares, no par value. L. J. Gracey, C. B. Sturrock and others. To manufacture and deal in stone, artificial stone, tile, etc.

Vermont Weathering Green Slate Co., Granville, N. Y., $400,000. Eugene R. Norton, Fred C. Sheldon, Hugh G. Williams, all of Granville. To operate quarries and deal in slate and slate products.

Stoneite Products Corp., 18th Ave. and E. 9th St., Rockford, Ill., $12,000. Fred H. Ahlstrand, Haughton Brown, John Wester, A. T. Floberg. To manufacture wall-board, plaster and building compounds.

Richard's Texcrete Products Co., 845 New Seatland Ave., Albany, N. Y., $75,000—1000 shares common, par $50; 500 shares preferred, par $50. Lemuel Richards, John H. Richards. Cement products, including brick.

Riverview Mining Corp., Wilmington, Del., $300,000. S. B. Shaffer, James C. Shaffer, Punxsutawney, Penn.; T. S. Heasley, Du Bois, Penn. Capital Trust Co. of Delaware. To mine and deal in all kinds of minerals.

Rock Island Clay and Stone Co., Rock Island, Ill., $75,000 common and $75,000 preferred. Wm. Paulson, Rock Island; Victor Ross, New York City; K. J. McHranery, G. M. Walsh and M. Shiolo. The company plans to erect a $100,000 plant at Mathersville, Ill.

Quarries

Mystic, Iowa; a new limestone project is said to be under development here.

Big Creek Crushed Rock Co., Marshall, Ill., is building a $65,000 plant.

Camp Consolidated Rock Products Co., Brooksville, Fla., has purchased the equipment of the former Keystone Rock Co. and is installing it in a new plant at Brooksville.

Scarlet Stone Co., Pipestone, Minn., is reported to be planning for a new crushing plant, north of its present plant, to cost from $75,000 to $100,000. The crushed stone is said to be shipped in large quantities to Chicago for the manufacture of roofing.

James Stone Co., Corsicana, Tex., which operates a stone-crushing plant at Richland, Tex., is installing new equipment in the quarry with a view of increasing the capacity of the plant. An Armstrong No. 50-BE all-steel, blast-hole drill has been purchased, which is the second machine of this type installed at this quarry the past year.

Decorah Stone Products Co., Decorah, Iowa, has been acquired by the Dickinson-Stark Co., excavating contractors of Des Moines, which will operate this plant in the future. Considerable new equipment has been installed, including an Armstrong 50-B all-steel, blast-hole drill. The plant has a capacity of 800 tons daily. Most of the stone will be used for road building in northeastern Iowa.

Dominion Trap Rock Co., Bruce Mines, Ont., is reported to have secured options on considerable property at the village of Hilton Beach, St. Joe Island, near Sault Ste. Marie, Ont., on which it is understood a plant will be erected this fall. It is estimated that this plant will cost at least $350,000. It will be modern in every respect and will have large docks and a conveyor three-quarters of a mile long. Material will be shipped to the United States from the new plant, which is expected to be in operation by next spring.

Indiana Limestone Co., Bedford, Ind., booked more new business last month than in any other month in its history, Frank S. Whiting, treasurer, stated recently. Since the company began business on June 1, 1926, its mills have shipped slightly less than 40,000 cars of limestone. In the same period, plant improvements have been made exceeding $800,000 in value. The company has charged off, for depletion and depreciation, a total of almost $2,000,000, and has reduced its outstanding funded debt by $800,000. The cut stone department has on hand unfilled orders to keep the mills busy at normal capacity for eight months.

Melrose Granite Co., St. Cloud, Minn., has purchased a tract of about 200 acres 18 miles forth of Chisholm, on which it has found a very good grade of granite, it was reported by H. E. Winchester, granite expert, who has been doing exploring work on this section for the last year or more. The Melrose company, one of the largest in the United States, proposed to cut the granite into blocks and ship them in the rough to St. Cloud for cutting and finishing. Shipment will be made from Angora, about 12 miles from the field. Considerable machinery has already been brought here and extensive operations are to be opened up. Some time ago Mr. Winchester thought that a finishing plant might be erected near the field, but this plan has been abandoned for the present.

Frank A. Kuntz, Center Valley, Penn. executed a difficult piece of blasting on July 17. Nine well-drill holes 6 in. in diameter. 41 ft. deep, were loaded with 2050 lb. of du Pont 40% and 60% gelatin dynamite. C. V. Weaver, Easton, Penn., was in charge for the du Pont company. On account of the crushing equipment being less than 100 ft. from the face of the quarry it was a rather risky undertaking, but fortunately there was no damage done by the shot to equipment or surrounding properties. These stone are used for road building, general construction, poultry grits and agricultural purposes. Analysis shows the stone to be composed of 56.59% $CaCO_3$ and 43.07% $MgCO_3$. The quarry is located along the state highway leading to Philadelphia from Allentown and Bethlehem, in what is known as the fertile Saucon valley. Fifty acres of Mr. Kuntz' 116-acre farm is underlaid with the above stone and the balance is sandstone. There is very little overburden to be removed in reaching the stone.

Sand and Gravel

C. M. John and Sons Sand and Gravel Co., West Helena, Ark., are erecting a $25,000 concrete and brick office building.

Norfolk Sand and Gravel Corp., Norfolk, Va., is constructing a dock 420 ft. long, with loading facilities, storage bins, etc.

Valley View Sand and Gravel Co., Troy, N. Y., is arranging to ship sand and gravel by barge to New York City. The company has added a cableway slack-line excavator to its dragline operation to excavate below water level.

Garden City Sand Co., Chicago, an Illinois corporation qualified to do business in Indiana, has filed an affidavit with the secretary of state in Indianapolis designating C. V. Ridgeley of Gary, Ind., as its Indiana agent for service of process.

Macon Sand and Gravel Co., Macon, Ga., has been organized to take over the property and business of the Macon Sand Co. It is reported additional equipment will be installed and production increased. The principals in the new company are F. N. Watkins and J. R. Hatfield.

Colonial Sand and Gravel Co., Waterbury, Conn., has elected the following officers: Frank Perugini, president and treasurer; Angelo Mangini, first vice-president; Giuseppi Santopietro, second vice-president; Salvatore Rinaldi, secretary. All the officers and Nicola Perugino constitute the board of directors.

Keystone Sand and Supply Co., 302 Penn avenue, Pittsburgh, Penn., has work under way on new sand and gravel handling and storage plant on South Third street, to include a battery of 10 elevated steel bins, ground bins, conveying and loading, equipment, and other handling apparatus; a boiler plant will be installed. Entire project is reported to cost more than $125,000.

Mike and Jack Edwards have purchased the bunkers, crusher and other equipment at Knudson, Ore., formerly operated by O. Hammer and Co. The new owners started operations recently. The Edwards brothers have a contract to crush and screen approximately 100,000 cu. ft. of gravel for the Southern Pacific railway. The material is to be used for ballasting the track from Cochran to Tallamook. Rock is scraped from the bar owned by Solon Schiffman.

Peru Sand and Gravel Co., Peru, Ind., has been recently organized by C. P. Welch, H. L. Howard and R. R. Rhodes with a capital of $10,000. The company owns 24 acres of land along the Wabash river near Peru and now is building bins and installing equipment for producing and screening sand and gravel. The land has a vein of gravel 65 ft. deep, with at least 1,000,000 yd. available. The company now is preparing to build a tramway to extend from the plant across the Wabash river to carry the gravel across the river to be placed in storage bins there, from which it may be loaded directly on traction cars for shipment.

Ohio River Sand Co., Louisville, Ky., has completed a new sand digger, costing about $400,000, designed by Captain Hamilton Duffy and built by the Dravo Construction Co., of Pittsburgh, Penn. The new boat is of steel construction and uses the ladder or endless chain type of pick-up. It is somewhat larger than one built for the company by the same interests three or four years ago. In addition to these two dredges the company still has one of its old sand sucker types in use, which will be held principally for emergency use. The new boat arrived in Louisville on July 29 and was in service on July 30. The dredge is 155 ft. fong, 44-ft. beam and 8-ft. hold. It has a capacity of 300 tons per hour at a depth of 55 ft.

Fort Gaines, Ga., will soon have another gravel pit located near the city and on the banks of the Chattahoochee river north of the city. The gravel will be taken from the river and washed and made ready for shipment. Leases have been taken up along the bank of the river for some five miles up the river and it is claimed that large deposits of gravel are imbedded in the river banks and adjacent territory. Parties from Florida have been here this week perfecting the plan and making ready to open the plant. There is already one gravel pit located just north of the city at Killen which has been in operation for several years. This plant was installed by the Birmingham Slag Co. and is now being operated by the Fort Gaines Gravel Pit Co. C. A. Goldsmith, of Tallahassee, Fla., is in charge of negotiations for the new project.

Cement

Atlas Portland Cement Co., Leeds, Ala., was the subject of a full page of pictures in the photogravure section of the *Birmingham* (Ala.) *News-Age-Herald*, Sunday, July 22.

Lawrence Portland Cement Co., Thomaston, Me., is reported to have curtailed production 50% by shutting down one kiln. Officials of the company attribute the slack demand to foreign competition and high freight rates.

Superior Portland Cement Co., Concrete, Wash., held its annual anniversary picnic on August 4, for employes and their families. The events listed on the program included races, small sports and contests of various kinds; some short talks by various officials, with John H. Kane of Seattle as the principal speaker, and a fine dinner, with barbecued salmon as the main item on the menu.

Manitowoc Portland Cement Co., Manitowoc, Wis., has received the contract to supply 90,000 bbl. of portland cement for the new Merchandise Mart in Chicago, which is being built by the Marshall Field & Co. interests. The cement will be delivered directly to the new building by boat from the Manitowoc plant, as the building is situated upon the Chicago river near Lake Michigan. The Merchandise Mart will be the world's largest building completely devoted to a single industry. The Con-

ARNOLD & WEIGEL
CONTRACTORS AND ENGINEERS

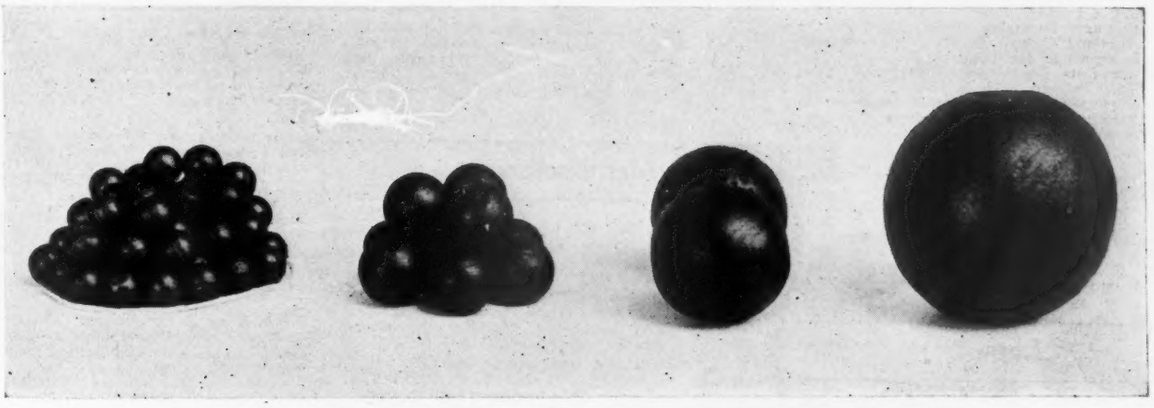
Thinking of expanding or remodeling your lime plant? If so, how would you like to be relieved of all responsibility—to have the plant when completed, turned over to you as a ***going concern?***

ARNOLD & WEIGEL "CENTRALIZED CONTROL" LIME PLANT SERVICE

means a complete shifting of responsibility from ***you*** to ***us.*** It means DESIGN—CONSTRUCTION—EQUIPMENT—SERVICE. Our catalog gives details.

WOODVILLE, OHIO, U.S.A.

COATES GRINDING MEDIA



Insure Economy and Efficiency

CARBEX Forged Steel Balls—7/8-in. to 5-in. diameter.
"TUNGSCO" Steel Grinding Nuggets—5/8-in. x 1-in. to 1¼-in. x 1⅜-in.

Largest Manufacturer of Grinding Media Exclusively

COATES STEEL PRODUCTS COMPANY
GREENVILLE, ILL., U. S. A.

sumers Co. and the Aetna Sand and Gravel Co., both of Chicago, will together supply 20,000 cu. yd. of torpedo sand and 40,000 cu. yd. of gravel for the construction.

Aransas Pass, Tex.; sixty days additional time, expiring September 25, has been granted by the Texas Railroad Commission to start work on the Harbor Island cement plant, which is to utilize the millions of tons of shell mud on the Texas coast. Delay in starting is reported to be due to inability to get a suitable dredge. In the application for an extension of the permit, which would have expired recently, Fred C. Robertson of Los Angeles said 60 days additional time would be sufficient.

Cement Products

Des Plaines Concrete Products Co., Des Plaines, Ill., has added a new line of ornamental garden furniture, including benches, urns, bird baths and similar pieces.

Cement Stave Silo Co., Longmont, Colo. An interest in the company has been purchased by Walter G. Barnes of Rangely, Colo., and he will become associated with Ray Barnes of Longmont in expanding the business of the concern.

Fort Scott Individual Mausoleum Co., Ft. Scott, Kan., has started the manufacture of its product at the former plant of the Ft. Scott Hydraulic Cement Co., which was recently leased. A. M. Robertson is secretary and treasurer of the new company.

Escambia Concrete and Supply Co., Pensacola, Fla., is about to start the construction of a new $35,000 plant for the production of ready-mixed concrete. The plant, which will be the first of its kind in western Florida, will have a capacity of 200 cu. yd. daily.

Olympia Concrete Products Co., Olympia, Wash., has started work on the foundation and first floor of its new building being erected in the county port district at Olympia. Septic tanks, tile, concrete pine and a general line of products will be manufactured at the new plant, according to E. D. Whitemarsh, owner of the company.

Syracuse, N. Y. It was recently necessary for Supt. Wellington Tabor of the city bureau of building to require extensive tests on all concrete building units sold within the city, as complaints had reached the bureau that some manufacturers were using poor mixes and allowing no time for curing of their blocks. The tests are to be made by engineering laboratories of Syracuse University.

Gypsum

United States Gypsum Co., Chicago, Ill., has been refused a building permit for projected new plant in East Chicago, Ind., on account of alleged dust nuisance.

S. H. Roberts and associates, Fort Collins, Colo., are operating a gypsum mine to supply crude gypsum to the new Boettcher, Colo., plant of the Colorado Portland Cement Co. The mine, located on what is known as the Pease place, is leased by Mr. Roberts from the owner, a Mr. Saxton of Denver. Mr. Roberts holds a contract with the cement company to provide gypsum necessary in its manufacturing processes. The gypsum is procured from a ledge near the filling station. The ledge is 65 ft. wide, 9 ft. thick and 30 ft. long. An average of 1 in. of gypsum is removed daily from the bed. This provides an average of 30 tons daily. The cement plant uses 600 tons of the gypsum each month. Officials of the plant claim that the product is the best gypsum obtainable.. They estimate that the ledge being mined at present will be sufficient for the needs of their factory for 25 or 30 years. S. H. Roberts, his two sons and W. McMayhill are partners in the gypsum mining project.

Lime

Cook and Brown Lime Co., Oshkosh, Wis., has increased its capital stock from 1800 shares at $100 par per share to 2500 shares, $100 par value, and by authorizing an issue of 2500 shares of 6% cumulative preferred stock at $100 per share.

Washington Building Lime Co., Baltimore, Md., is reported to have closed its Strasburg, Va., plant after 19 years' operation. Lack of orders combined with a desire to concentrate its operations at its plant at Bakerton, W. Va., is said to be the reason for the closing of the plant. W. J. Flanagan, manager of the plant, has been transferred to the Bakerton operation.

Nast Lime and Stone Co., Marblehead, Wis., expects to start operations within six weeks. During the summer the company has been occupied in getting buildings, kilns and equipment ready for production. Two large kilns are now finished with the exception of firebrick linings, which has been delayed in shipment. Trestles have been constructed for elevating stone to the kilns, and earth has been removed from a stone ledge where the raw material will be quarried. The plant is a short distance east of Marblehead on the William Nast homestead.

Agricultural Limestone

Columbia Products Division of the Pittsburgh Plate Glass Co., Zanesville, Ohio, entertained at a banquet at the George Washington hotel, Washington, Penn., July 26, various dealers in its agricultural limestone. The banquet was given in the form of a complimentary dinner as a reward for the increased sales in this territory. It also provided an excellent chance for a meeting of the dealers in this part of Pennsylvania. C. W. Fuller, secretary and treasurer of the Columbia Products Division, and W. W. Bolton, representative for Pennsylvania and New York, outlind detailed information on the subject of "Plant Lime" as used to increase the growth of clover and sweeten the soil. Mr. Bolton stated that extensive plans are being made to further acquaint the farmers in this section with the new advantages of "Plant Lime" and its many uses. W. H. Dunlap, distriqbutor for the Canonsburg district, stated that it was a wonderful product and would do all that it claimed to do.

Silica Sand

Eastern Silica and Chemical Corp., Winchester, Va., has acquired 188 acres of glass sand deposits in the western part of Winchester county, to be developed with new plant. John F. Penrose is president.

Obituaries

C. Kemble Baldwin, vice-president of the Robins Conveying Belt Co., New York, died in Los Angeles on August 9, after a lingering illness. He was born at Philadelphia in 1873 and was graduated from Lehigh University in 1895.

Joseph Kotlunek, Sr., said to be the founder of the quarry enterprise at Thornton, Ill., now owned by the Brownell Improvement Co., died recently at his home in Villa Park, Ill. He came to the United States from Bohemia in 1852. He went to work at a lime kiln at Thornton and remained in the quarry business until 1895.

Robert Weeks Kelley, at one time president of the Vulcan Portland Cement Co. and a director of the Canada Cement Co., Ltd., died August 4 in Paris. He was born March 2, 1853, and graduated from Yale University in 1874. For seven years beginning in 1881 Mr. Kelley was president of the Echo Farm Co. of Litchfield, Conn. Later he also headed the following companies: Kanawha and Ohio Railroad Co., Kanawha and Michigan Railroad Co., Warren-Burnham Co., Virginia Portland Cement Co., Vulcan Portland Cement Co., Holly Sugar Co. and other concerns. In recent years Mr. Kelley had been president of the William Holland Wilmer Foundation, a director of the American and Knickerbocker Ice companies, the Shawinigan Water and Power Co., Canada Cement Co., Ltd., Empire Coal and Coke Co., and Southwest Metals Co.

Manufacturers

L. B. Foster Co., Pittsburgh, Penn., has opened a branch office in the Railway Exchange Bldg., St. Louis, Mo.

Young Radiator Co., Racine, Wis., has received a contract for one year to supply the Chicago Pneumatic Tool Co., of New York City, with the complete line of radiators needed for the latter company's portable compressors.

F. L. Smidth and Co., New York City engineers, and manufacturers of cement mill machinery, will soon begin work on a one-story foundry addition at Elizabeth, N .J., to cost about $25,000. A crane runway will be installed. John S. Branne, New York, is consulting engineer.

International Combustion Engineering Corp., New York City, has announced that Grant Thorn, recently sales manager for the American Cyanid Co., is to be associated with the subsidiaries of the International corporation, which are identified with coal tar products and allied chemical fields.

Wagner Electric Corp., St. Louis, Mo., announces that Fred Johnson, formerly in charge of the company's St. Louis sales office, is now manager of the Los Angeles branch office. Mr. Johnson has been connected with the Wagner corporation for 21 years.

Sullivan Machinery Co., Chicago, has announced the appointment of the United Hoisting Co., New York City, the Eastern Utah Iron and Metal Co., Salt Lake City, Utah, and the Standard Equipment and Supply Co., Sacramento, Calif., as distributors for the company's line of compressors, drills, hoists and similar equipment.

Continental Motors Corp., Detroit, has announced the appointment of F. W. Sampson as engineer in charge of the shock absorber division, according to an announcement by Col. Geo. W. Blackinton, head of that division. Mr. Sampson has been with the company for four years on the regular engineering staff.

Stephens-Adamson Mfg. Co., Aurora, Ill., has adopted the fixed policy of using air mail for every piece of mail between the main office and the Pacific Coast factory at Los Angeles. The resulting saving in time more than compensates for the added expense, even before the recent reduction in air mail rates, and enables the company to get out orders and information with a saving of several days' time.

Merco Nordstrom Valve Co., San Francisco, Calif., has moved from its Second St. office to new quarters at 343 Sansome St. With the Merco Nordstrom company has moved the offices of the Merrill Co. and the Alloys Co. The Merrill Co. occupied the old offices for 15 years and the valve company has been located there since it was organized as a subsidiary of the Merrill Co. in 1924. The new location will provide facilities for a complete laboratory.

Atlas Conveyor Co., Philadelphia, announce that A. J. Forschner has become associated with the company as vice-president. Mr. Forschner was formerly connected with the R. H. Beaumont Co. as sales manager for the sand, gravel and stone department, and previous to that was president of the Alfred J. Forschner Co., distributors for Sauerman Bros. equipment. The Atlas company has also announced that in addition to its coal and ashes handling equipment, it will begin the production of drag scrapers for excavating and storing sand and gravel and similar products. The company also proposes to build slack line excavators for excavating gravel from deep pits and from under water.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Vibratory Screens. Illustrated **Bulletin No. 52** of vibrating screens for separating and sizing material of all kinds. PITTSBURGH COAL WASHER CO., Pittsburgh, Penn.

No Loss. An illustrated bulletin describing the advantage of the use of multi-wall paper bags for cement to prevent loss during handling. BATES VALVE BAG CO., Chicago, Ill.

Steel Roof Deck. Twenty-four-page bulletin on steel roof deck for industrial plants, illustrated with plates of all details of construction. THE R. C. MAHON CO., Detroit, Mich.

Counterflow Screens. Illustrated catalog of counterflow screens providing complete rotating action against the flow of the material. NIAGARA CONCRETE MIXER CO., Buffalo, N. Y.

Loaders and Shovels. Illustrated bulletin on low-lift and high-lift loaders for various materials, mounted on tractors, either with or without crawler treads. TRACKSON COMPANY, Milwaukee, Wis.

Drying Equipment for Cement Products. Illustrated announcement of drying racks and drying floors, and also of overhead bins and similar equipment. COMMERCIAL SHEARING AND STAMPING CO., Youngstown, Ohio.

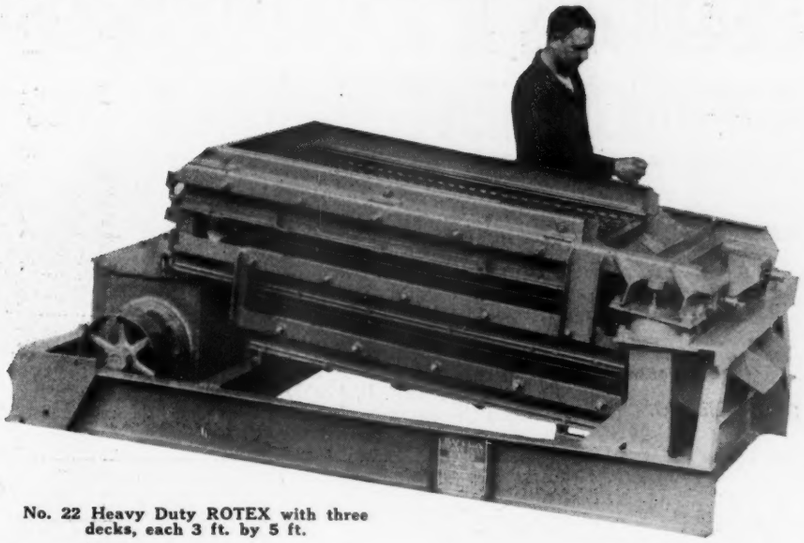
Diesel Engines. Bulletin No. 35 containing reprints of a number of the company's advertisements of the past year, presenting in this novel way the outstanding features of these engines. ANDERSON ENGINE & FOUNDRY CO., Anderson, Ind.

A.S.M.E. or Better Boilers. The April issue of "The Safety Valve," containing a discussion of the minimum requirements for boilers as stated in the A.S.M.E. code, compared with the manufacturer's own requirements for boilers. INTERNATIONAL COMBUSTION ENGINEERING CORP., New York City.

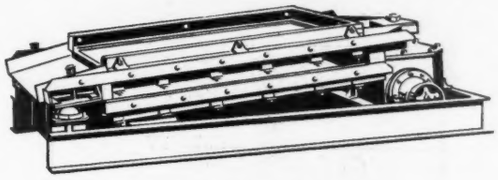
Manual of material and methods for fireproof construction. Ninety-six page book of data on such building material as metal lath, reinforcing material and similar products, fully illustrated with pictures of the materials and views of the installations, and containing standard specifications and tables for reinforced concrete design. MILWAUKEE CORRUGATING CO., Milwaukee, Wis.

Burning Pulverized Fuel. New catalog illustrating and describing the "Lopulco" unit system for burning pulverized fuel, and covering the various types of horizontal, vertical and tangential burners used with the system. **Traveling grate stokers.** Reprint of an illustrated article by T. A. Marsh on the design and application of traveling grate stokers. **Forced-draft chain grates.** Reprint of an illustrated article by T. A. Marsh, on the design and application of forced-draft chain grates. COMBUSTION ENGINEERING CORP., New York City.

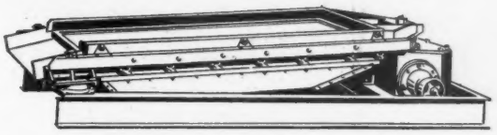
ROTEX



No. 22 Heavy Duty ROTEX with three decks, each 3 ft. by 5 ft.



No. 18 Heavy Duty ROTEX with two decks, each 4 ft. by 6 ft.



No. 14 Heavy Duty ROTEX with single surface 4 ft. by 8 ft.

A Screen for Every Purpose

ROTEX Screens—now offered in single, double and triple deck models—constitute a complete series of screening equipment that will satisfactorily handle any production screening operation in a crushing and screening plant. These machines are very versatile and will produce consistently accurate separations while handling any screenable material.

The features of design and construction that have long distinguished ROTEX Screens are embodied with equally successful results in each unit. These include the patented "ball-and-bevel-strip" mesh cleaning system and the ROTEX level, circular screen motion—both of which contribute tremendously to greater capacity and efficiency.

All models are real heavy duty units, require very little headroom, are waterproof, dust-proof, and as well adapted to sprays or dewatering, as to dry screening.

Write for Catalog No. 81

The ORVILLE SIMPSON COMPANY

Office and Factory
1221 KNOWLTON ST. CINCINNATI. OHIO

When writing advertisers, please mention ROCK PRODUCTS

The Only Paid Circulation Covering the Rock Products Industry

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Entered as second-class matter, July 2, 1907, at the Chicago, Ill., postoffice under the Act of March 3, 1879. Copyrighted, 1928, by Tradepress Publishing Corporation.

Contents for September 1, 1928

Nonmetallic Industries of New England 41-45
Their economic importance and their needs and prospects. By Oliver Bowles.
Technical Development of the Japanese Cement Industry 45
Brief resumé of portland cement history in Japan. By C. R. Platzmann.
The Quarry Industry on the Mississippi River Below St. Louis 46-54
General observations from an editorial journey to Ste. Genevieve, Cape Girardeau and southern Illinois. By W. B. Lenhart.
Lime Burning Practice Based on European and American Observations 55, 56
Part IX.—The Hanstaeten gas-fired kilns (Germany). By Victor J. Azbe.
Again, That Matter of Costs 57-59
How to make use of cost data to reduce costs of portland cement manufacture. By H. H. Blaise.
A Complete Southern California Gravel Operation 60-64
Livingston Rock and Gravel Co. operates concrete batching and asphalt plants. By James N. Hatch.
Digest of the Literature on Nature of Setting and Hardening Processes in Portland Cement 65-68
Part V.—The chemical nature of the setting and hardening processes. By R. H. Bogue.
Thomaston, Maine, Lime Plant of the Lawrence Portland Cement Co. 69-73
Notable new plant with some rather unique features.
Modern Flotation Plant for Graphite 74-77
New concentration plant of the Southwestern Consolidated Graphite Co., Burnet, Texas. By H. B. Menardi.
Iron Oxide vs. Alumina as a Fluxing Agent for Portland Cement 78, 79
Supplementing two previous articles. By Alton J. Blank.
New Feldspar Grinding Mill Uses Modern Methods to Obtain Uniform Product 82-84
Plant of Golding Sons Co., Trenton, N. J.
Accident Prevention in the Portland Cement Industry 88-91

Departments

Hints and Helps for Superintendents 80, 81
Editorial Comment 85
Financial News 86, 87
Foreign Abstracts and Patent Review 92
Traffic and Transportation News 96, 97
Cement Products 99-101
Current Prices of Rock Products 102-106
New Machinery and Equipment 108, 109
News of the Industry 93-95, 98, 107, 110
Classified Directory of Advertisers 118-124

TRADEPRESS PUBLISHING CORPORATION
542 South Dearborn Street, Chicago, Illinois, U. S. A.
W. D. CALLENDER, *President*
N. C. ROCKWOOD, *Vice-President* C. O. NELSON, *Secretary*

LONDON OFFICE: Dorland House, Mezzanine Floor, 14 Regent St., S. W. I.

NATHAN C. ROCKWOOD, *Editor and Manager*
EDMUND SHAW, *Editor*
HORATIO M. FITCH, *Assistant Editor*
WALTER B. LENHART, *Assistant Editor*
R. W. ANDERSON, *Manager, Research and Service Dept.*
E. A. SINE, *Production Manager*
GLENN BEAVERS, *Manager, Advertising Copy Department*

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies

GEORGE M. EARNSHAW, *Eastern Manager*
FRED S. PETERS, *Eastern Representative*
280 Madison Ave., New York City. Tel. Caledonia 4474
WALTER E. EDWARDS, *Central Advertising Manager*
803 Leader Bldg., Cleveland. Tel. Main 4056
RALPH C. SULLIVAN, *Advertising Manager*
W. A. WILSON, J. M. COX, *Western Representatives*
Chicago. Tel. Wabash 3714-3715

TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address

The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products. The A. B. C. is an organization which audits and verifies publishers' circulation claims and records.